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Measurement of SME risk and its relationship with SME operating characteristics:

An empirical study in Malaysia

A thesis

submitted in fulfilment

of the requirements for the degree

of

Doctor of Philosophy in Finance

at

The University of Waikato

by

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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2018

Abstract

SMEs are inherently risky organisations reflected in high birth and death rates in many countries. This risk of failure is exacerbated by the financial and operational opacity of SMEs, which hamper efforts by authorities and investors to evaluate and value objectively SMEs. Despite a wide spread view that SMEs are risky there is little evidence of generalizable, empirical estimates SME risk and supporting analyses, covering the relationship between operational characteristics risk. Commencing from a premise that there needs to be a robust framework for quantifying SME risk this research examines, using a Malaysian database, risk measures and their relationship to observable attributes of SMEs. The work is important for a range of stakeholders, including government in relation to sustainable economic growth goals and other areas of public policy. Investors, customers, suppliers, employees and society are unlikely to benefit from business churn where some of it is avoidable.

Malaysia, one of the larger economies in Southeast Asia (by GDP) is a multi-cultural country with a diversity of ethnicities. In the 1990s, it, along with various other East Asian countries underwent an economic boom that subsided with the onset of the Asian financial crisis in 1998. It is a constitutional monarchy with members of the royal Malay families assuming the role, in rotation, of Head of State. Given its diverse demographic, Malaysia actively practices an affirmative action scheme designed to give indigenous people (the Bumiputera) better access to finance, education and business opportunities to promote greater economic parity across the different ethnicities living in the country. Islam is the State religion with close to 60% of the population practicing the religion. As such, Islamic finance is

widely available and has come to characterise Malaysian fiscal policy as being very conservative and risk-averse in accordance with Islamic principles.

SMEs in Malaysia are predominantly family-owned and control is often centralised in the hands of the family, with very few outsiders rising to high managerial positions within these businesses. There is little to no separation between management and shareholders as they are typically the same. This lack of separation creates unique governance issues where the CEO and the Chairman of the board are often the same person. This creates a conflict of interest between the principal (owner) and the agent (manager) as there are weaker checks and balances performed against the CEO if they are the head of the Board of Directors. However, in a family business, because the CEO/Chairman is the head of the family, principal-agent conflict is virtually eliminated as the CEO and the Chairman's goals align. Despite this, principal-principal conflict still exists through leadership tussles, nepotism and poor consensus decision making. SMEs have contributed significantly to the Malaysian GDP and play a very important role in the economic development of Malaysia.

The Companies Commission of Malaysia (Suruhanjaya Syarikat Malaysia - SSM) records SME data, as all Malaysian businesses, regardless of their size are required to furnish the authorities with regular annual reports. The initial dataset consists of an unbalanced panel dataset of 400 individual companies over the years 2005 to 2014. After data cleaning and removal of dormant and insolvent companies, this figure is reduced to 303 individual companies. The current research draws on the information covering financial statements; owner ethnicity, age and gender; business location; shareholding and items stored in the database, providing a rich panel of data for businesses over time.

Most empirical risk and return measures, relating to models like Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) originate from research with publicly listed companies and initially in large mature western economies. For SME research, where firms are not listed on stock exchanges, other approaches are necessary. Four models are examined in this thesis, viz. the pure-play (PP) beta, accounting beta and two probability of survival models (1 & 2). These models noted in prior research are tractable within the constraints of data typically available for SMEs and are present in the SSM database. A selection of SME characteristics identified in the literature as connected with SME risk, these include financial indicators such as performance and capital structure; firm characteristics such as firm size, firm age, the firm's sub-industry and firm's geographical location; and owner demographics such as owner age, largest share percentage, business owner gender and business owner ethnicity.

The analysis consists of two parts. First, a correlation analysis of the risk metrics against the other SME characteristics. The correlation analysis shows that PP beta has the highest level of correlation with not only the other risk measures but also the SME characteristics. The other risk measures have lower cases of significant correlation with the accounting beta having the lowest number of significant correlations with SME characteristics.

Second, each risk value is regressed against the SME characteristics using the Dynamic Panel Data Generalised Method of Moments (GMM) regression technique, which effectively captures the panel nature of the data and mitigates the threat of endogeneity. The regression results show that the PP beta measurement has the most significant relationships with the selected SME characteristics, most notably in areas of financial performance and gender of the business owner. The

other measurements recorded significant relationships in the same areas as well as capital structure. Interestingly, despite Malaysia's affirmative action policies, there is no significant relationship between any of the risk measures and business ethnicity. Furthermore, despite a large portion of Malaysian SMEs involved in the service sector, the type of industry SMEs are in do not significantly affect their risk either.

The presence of family ownership as represented by concentration of ownership in the largest share percentage is not significantly related to risk, indicating that principal-principal conflict does not adversely affect Malaysian SMEs. Firm size and firm age both are not significantly related to SME risk, providing some hope for smaller, younger businesses trying to convince finance providers to invest in them. Owner age is significantly related to the probability of survival model 1, however it does not significantly relate to any of the other risk measures. The identification of significant relationships between capital structure with SME risk is relevant to lenders and can assist them in pricing their loans to SMEs. The finding that neither firm size nor age are not statistically significantly correlated with SME risk has implications for loan terms and bargaining.

The research concludes that PP beta, used in conjunction with a probability of survival model provides the most adequate measure of risk for unlisted SMEs. Combined with the results from the regression, this research challenges some long-standing assumptions held regarding the relationship between SME characteristics and risks in the hopes that the findings will influence policy makers and finance providers to give better financial and development support to SMEs.

Acknowledgements

This thesis has been a labor of love and while it may have my name on it, it could not have been possible with the help and support of several individuals and organisations whom I will do my best to name and give credit to in these acknowledgements. First and foremost, my thanks go to my parents, Raja Maznah Raja Hussain and Harith Ahmad, for not only taking care of my daughter in my absence but for also providing emotional and professional support throughout my PhD. My mother, being an academic herself, deserves special mention in this respect as she has served as my inspiration for pursuing a career in academia and this thesis stands as a testament to the influence she has had on my life. My father, with his keen financial acumen and technical skills has always been my sounding board and emotional rock throughout these long years pursuing my PhD.

To my supervisory team, I thank Stuart Locke whom, as the chief supervisor has shown great patience and wisdom in providing guidance to me and for giving ideas to help inspire the initial research topic of this thesis. I thank Nirosha Wellalage, as the second supervisor for working tirelessly in assisting me in the very difficult process of model development and specification. And of course, I thank Helen Samujh, who despite retiring partway through my PhD, still continued to offer kindness, support and a keen eye for grammatical mistakes, despite not being obliged to do so. All my supervisors have worked tirelessly to build me into the researcher I am today and this thesis is just as much their work as it is my own and for that I am forever grateful.

This work would also not have been possible without the support of the Malaysian Companies Commission, who were pivotal in sourcing and providing the data

necessary to this research. The Post-graduate Student's Association of the University of Waikato were also crucial in providing support and guidance to me. As a PhD student, I have benefited greatly from their activities.

Last but not least, I want to thank my daughter, Ruhi Iman Samir, for being such a patient young person and for showing a degree of maturity far beyond her age. Since the beginning of my PhD we have had to spend almost three years apart but she has never complained or made a fuss about my absence. If anything, she has continued to show positivity and faith in me. She has, and will always be my biggest supporter.

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1 Introduction

1.1 Introduction

What is a suitable measure for estimating Small-Medium Enterprise (SME) risk? How does this risk relate to SME operations? What aspects of their business can owners pay more attention to to achieve the desired outcomes and returns on their business operations?

Using the questions as a starting point, this research highlights the need to capture and effectively price the risk associated with SMEs. SMEs form integral parts of many world economies and are crucial to the development of local industry. All multi-national companies started off as small companies and it is imperative that governments encourage the development of SMEs to grow their own domestic exports and economic power. However, SMEs across the globe face low survivability rates and well-informed policy is required to support and sustain local SME growth in countries around the world.

This research develops measurement tools based on adaptations of existing models in the literature to estimate SME risk. Taking into account their opacity and operating conditions, this research also identifies the factors which affect SME risk and explains the importance that each operating factor has upon the business. It is hoped that the findings of this research can be of use to policy makers and SME owners alike.

This first chapter serves as an outline of the motivation for the study. The problems highlighted by the existing literature are identified and elaborated upon. Solutions

to those problems proposed by this research will be mentioned as well. The scope of the study is delineated to better frame the context and background of the research. Finally, the significance and major contributions of the study are raised and emphasised upon in the end of this chapter.

1.2 Problem Statement

There are many issues surrounding SME risk and measurement. This section makes an argument that SMEs, by nature, are high-risk investments. However, despite their high-risk nature, governments and individuals continue to invest in them because of their importance to local economy and society. The continued investment into SMEs means that a means of measuring SME risk needs to be developed, one that deals with the pricing of risk and how it relates to the investment poured into SMEs. SMEs, just like any other investment, need to provide their investors a required return on investment to encourage investors to continue investing. The calculation of this required return is a difficult proposition, as the literature has dealt with methods of calculating risk for unlisted companies (such as the pure-play beta and the accounting beta) (Fuller & Kerr, 1981; Hill & Stone, 1980), but the design and adaptation of such models to suit SMEs are few, if any. The bulk of research on SMEs deal with SME default risks and is often approached from a lender's perspective on the likelihood of a business defaulting on their loans (N. A. H. Abdullah, Ahmad, Md. Rus, & Zainudin, 2015; Altman & Sabato, 2007). The lack of a survivability perspective means that SMEs operating as a going concern do not have an objective means of estimating their ability to remain a going concern.

1.2.1 The Risk Associated with SMEs

SMEs are considered high-risk borrowers by lending institutions due to their size, volatility and opacity (Berger & Frame, 2007; Meisenzahl, 2014; Vanacker & Deloof, 2013). SMEs face difficulty in obtaining necessary financing from financial institutions to support their working capital and growth expansion needs. Research has shown that due to the high degree of information asymmetry associated with SMEs, loans given to SMEs are charged a high level of interest and are often guaranteed by the personal assets of the business owner (Apilado & Millington, 1992; Kirschenmann & Norden, 2012). Apilado and Millington (1992) also find banks subject SMEs to high interest rates and restrictive loan covenants based on their size because they do not have a reliable means of estimating the required returns on SMEs' risk. In their research on minority business owners in the United States of America, Cavalluzzo, Cavalluzzo, and Wolken (2002) find the high rejection rates on loan applications by SME owners discourages some SME owners from even asking banks for a loan. The high risk associated with these SMEs hampers their ability to obtain financing. Financing is important for SMEs to fund their working capital cycle (Ardic et al., 2012; Bates & Robb, 2013). Without the funds to support their funding deficit, SMEs are even more likely to fail, creating a vicious cycle where because SMEs are prone to failure due to lack of funding, funders are discouraged from providing crucial funds to SMEs to support their operations.

1.2.2 The Perception and Attitudes Towards SME risk

A low perception of financial risk by SME owners is of some concern because Avery and Bostic (1998) show that SME loans are guaranteed by their business owner's personal assets, leaving the business owner in a situation of unlimited

liability in the event the SME is not able to repay the loan. SME risk is an important issue for SME owners because they can be used to provide an indication of the required return these owners should be making on their investments into the business. From the SME owners' perspective, there are more pressing matters to attend to than estimating risk to such as obtaining funding, marketing their product and growing their business (Brenner, Menzies, Dionne, & Filion, 2010; Gilmore, Carson, & O'Donnell, 2004). In their research on ethnic entrepreneurs in major Canadian cities, Brenner et al. (2010) find that marketing and human resource issues are more pressing concerns to these entrepreneurs. In their research on entrepreneurs' perceptions of risk in the UK, Gilmore et al. (2004) find that financial risk is not even a main concern, although some respondents emphasise the need to manage business cash flow properly. This runs contrary to research conducted by Bradford (2007) who finds that in his study of SME owners in South African shanty towns, a good understanding of finance and record keeping indicates a higher chance of business survival. While risk itself is not a core component of financing, it is an important indicator of the value of the investment the SME owner makes from the business. SME owners can reduce the amount of opacity associated with their business by pricing and disclosing the risk associated with the required returns on their investments. Knowledge regarding the SME's risk situation gives investors more information, allowing SME owners to obtain financing from financial institutions and investors at more favourable terms (Kirschenmann & Norden, 2012). A greater concern to SME owners and researchers in the field of SMEs is the likelihood of SME failure, in other words, the failure to service their loans and liabilities. While the likelihood of default is an important issue, it does not provide owners with the required returns they should be making on their

investments. If the SME is treated like an investment in a market security, the required return will give the SME owner a good idea of how much they should be making from the business and if that required return is not met, they should consider what options they need to choose to increase the actual return to meet the required return. The casual approach shown by SME owners in the literature towards financial risk creates a situation where SME owners are unaware of the risk borne by their businesses and the required return on their investments.

1.2.3 The Assessment of SME Finance Risk

Most banks use credit scoring tools such as the FICO (Fair, Isaac & Co.) credit scoring mechanism (Berger & Frame, 2007; Petersen & Rajan, 2002) and soft information gleaned from building a mature lending relationship with the borrower (Berger & Udell, 2002; Degryse & Van Cayseele, 2000; Petersen & Rajan, 2002) to evaluate loan eligibility. While lending to SMEs can be profitable for smaller banks (Kolari, Berney, & Ou, 1997), the high risk due to the opacity of SMEs often discourages many banks from lending to SMEs.

Calculation of financial risk, which can be translated into the investor's required return, is still under-utilized, meaning that operators of SMEs are depriving themselves of a useful tool for monitoring and predicting their business performance in the future (Cheung, 1999; Palliam, 2005b). Risk valuation is an important component of capital investment decision-making for publicly listed companies. By understanding the required return for investors, investment managers can make informed decisions and calculate the risk associated with future investments. SME owners expose themselves to great risks through the investments they make in their businesses, but without a measure of risk, they are unaware of the required return they need from the business. Risk valuation allows the owner to

monitor whether the returns from the business operation are commensurate with the amount of resources he/she has invested into it.

Firm characteristics such as capital structure (Baxamusa & Jalal, 2014; Yousfi, 2012), ethnicity (Bates & Robb, 2013; Cavalluzzo et al., 2002), maturity of relationship with banks (Kirschenmann & Norden, 2012) and firm size (Glennon & Nigro, 2005) have been shown to affect SMEs' loan maturity, access to capital and interest rates payable. Understanding the impact that SME characteristics can have on their risk will provide additional insight into how SME operations are affected by their circumstances and can also facilitate the remedial action needed to rescue a struggling business.

The majority of the literature regarding SME risk involves the issue of defaulting on loans and how to predict the risk of SME default (Abdullah, Ahmad, & Zainudin, 2014; N. H. Ahmad & Seet, 2009; Altman & Sabato, 2007; Edmister, 1972; Gaskill, Van Auken, & Manning, 1993). Efforts made to quantify SME risk have been limited to case studies (Britzelmaier, Kraus, Ha, & Beck, 2013; Palliam, 2005a) and theoretical papers (Cheung, 1999; Moro & Nolte, 2012). A means of capturing SME risk needs to be developed to understand the risk exposure faced by SME owners, and an understanding of the relationship between SME characteristics and risk/return will help create better strategies in reducing SME turnover. SME development is important to the economy of both developed and developing nations and this study provides the information needed to better understand how financial risk can be valued in SMEs and how business characteristics affect that risk.

1.3 Research Objectives and Questions

The problem statement has outlined the issues in the literature. This section will describe the objectives that this research has in addressing the problems highlighted in the previous section.

To promote a more objective assessment of SME risk, the measurement of that risk is important. This research considers the use of the financial beta (hereafter referred to as 'beta'), a measure for the volatility of a publicly-traded business based on the undiversifiable systematic risk inherent to the market (Black, 1972; Fuller & Kerr, 1981; Sharpe, 1964). It is the most widely used measure of risk for a business but the vast majority of literature concerning its application only relates to publicly-listed businesses (of which SMEs are few) (Ben David & Ben David, 2014; Troncoso, 2013). Estimating beta for SMEs is an important issue because SMEs are usually not listed on the stock exchange, so the usual information for the calculation of beta is unavailable. Stakeholders rely on assessing whether forecast returns are compatible with anticipated risk. The inability to price risk for SMEs affects various stakeholders in the SME at both societal (owner, customer, supplier) and national (policy-makers, Ministry of Economic Development) levels. As a result, SMEs do not have access to the same information that listed companies do in pricing the risk associated with their businesses. To address this issue, this research has the first research objective:

1. To outline means of measuring beta in an SME setting.

However, beta is not the only component which affects the pricing of risk. Cheung, (1999) is the first to point out the use of survivability in calculating the required return on an investment. His research was developed around the notion that small

business owners are more likely to be concerned about business survivability as opposed to financial risk, therefore the development of a required return model using survivability is more relevant to business owners. This model would be further refined by Moro and Nolte (2012) with the addition of more factors relating to entrepreneur experience and personal finance. The challenge in utilising the model developed by Cheung (1999) is that it assumes a blanket survival rate for all businesses in a given industry. For individual companies, this general approach to calculating survivability can lead to inaccuracies. As most research deals with the likelihood of SME default, this research will take a slightly different track with the following research objective:

2. To outline a means of measuring the probability of survival in an SME setting.

Beta and survivability represent risk and risk affects all SMEs, however the factors which affect risk are not clearly explained in existing literature. Financial aspects of SME have been known to affect SME operations. Profitability, for example, is often cited as a major indicator of SME health (A. Awang et al., 2009; Lowe, 2005; R Helen Samujh & Devi, 2008). More profitable SMEs are less likely to default and thus the risk associated with operating profitable businesses are lower. The capital structure of the SME relating to their use of debt and equity affects how SMEs source for financing. Many banks utilise these ratios to determine if a SME is a suitable debtor. The capital structure of an SME can affect its ability to do business and in this respect, it can affect SME risk. Looking at owner equity, the concentration of ownership in a business has often been used as an indicator of whether the business suffers from principal-principal agency cost, a type of agency cost which is common in family-owned small businesses(Kuan, Goh, Tan, & Mohd

Salleh, 2017; Renders & Gaeremynck, 2012). The presence of this concentration of ownership may affect SME risk as well. There are these indications of relationships between financial characteristics of the SME and its risk, however the literature is scarce on information regarding these relationships. This research has the following objective:

3. To determine the relationship between SME risk and its financial characteristics.

SME owners play a crucial role in the management and operation of their businesses. Various factors relating to owners can affect the performance and operation of an SME. The age and experience of an owner can determine a business' survivability and its return (Moro & Nolte, 2012). Furthermore, demographic factors such as ethnicity and gender of the business owner(s) can impact their ability to obtain funding and do business in the wider business environment (Gomez, 2012; Haughwout, Mayer, & Tracy, 2009; Rasheed, 2004; A. Singh & Zammit, 1999). These owner characteristics are known to affect SME operations, however the link between these characteristics and SME risk are not yet known. This research has the following research objective:

4. To determine the relationship between SME risk and its owner's characteristics.

SME firms are unique to each other, as they belong to different sub-industries, are of different sizes and of different ages as well. Different sub-industries face different operating conditions which can, in turn contribute to risk faced by these SMEs (Ragunathan, Faff, & Brooks, 2000). Larger firms are said to be more stable and more likely to turn a profit as compared to smaller firms. Conversely smaller

firms have higher growth prospects than larger firms. Size does matter from an SME's perspective as it translates into different operating conditions which can potentially affect risk. The longer a firm has been in business, the more goodwill it has built up with its customers, suppliers and various other stakeholders. This goodwill translates into easier dealings and even better access to financing. Older firms enjoy a benefit that younger firms don't, implying that younger firms face greater risk as compared to older firms (Beck, Demirguc-kunt, & Maksimovic, 2005; Chun, Chung, & Bang, 2015; Verwaal, Bruining, Wright, Manigart, & Lockett, 2010). Location and placement of the firm can affect its relationship with its suppliers, financiers and other members of its business network. Staffing can also be a challenge for firms located outside of major urban centres. The link between location and performance has been studied and ther is an implied connection between SME location and risk which has not been explored in the literature (Barringer & Greening, 1998; Brenner et al., 2010). Firm characteristics can affect an SME's risk. This research has the last research objective as follows:

5. To investigate the relationship between SME risk and its firm characteristics.

In achieving these objectives, this research will ask the following questions:

1. What is a suitable measure of SME beta to calculate required return?
2. What is a suitable measure of SME survivability to calculate required return?
3. What is the relationship between SME risk and its financial characteristics?
4. What is the relationship between SME risk and its owners' characteristics?
5. What is the relationship between SME risk and its firm characteristics?

1.4 Scope of study

The scope of this study are twofold:

First it is to investigate the methods available to calculate SME risk that work around the lack of market information, and demonstrates the calculation of SME risk using adaptations of the pure-play beta, accounting beta and probability of survival methods (Altman & Sabato, 2007; Ball & Brown, 1969; Cheung, 1999; Fuller & Kerr, 1981; Hill & Stone, 1980).

Secondly, this research investigates the relationship between SME risk and the financial, owner and firm characteristics of the SME. Risk here refers to the measurements derived from the measures used in the first part of the research. The different characteristics tested in this research represent the three categories of SME characteristics which are financial (profitability, gearing, concentration of ownership), owner (owner age, gender, ethnicity) and firm (firm age, size, sub-industry).

Within this scope, this research makes use of the Companies Commission of Malaysia (Malaysian acronym – SSM) database consisting of panel data for the years 2005 to 2014 for 236 Malaysian SMEs. The dynamic panel system GMM regression is used to investigate the relationship between SME risk and characteristics. The SSM database contains annual financial reports from all registered (listed and unlisted) business entities in Malaysia. This database also provides data on the financial statements, shareholdings, locations and ownership information of the registered businesses' operations in Malaysia.

Malaysia is the world's 21st largest exporter and China's largest trading partner in the Southeast Asian region (United Nations, 2017). It placed 16th in the World

Bank's ease of doing business index in 2016 (World Bank, 2017b). Its position as a leading newly industrialised country (NIC) provides an economic background that is undergoing rapid development. This allows Malaysian-based research to be generalised to other developing nations within the region. Malaysia's competitive economic ranking, as compared to other more developed countries, also facilitates easier comparison of research findings with findings in developed nations.

In this study, a selection of methods used to calculate SME risk are used to estimate SME risk in the absence of market based information. Dynamic panel data Generalised Method of Moments (GMM) estimators are used to identify the relationship between SME characteristics at different levels of risk and to mitigate endogeneity. The results of this study are of interest to policy makers, SME owners, industry practitioners and academics.

This study strictly focuses on the dataset derived from the Companies Commission Malaysia (SSM). All the variables used in this research are calculated based on the figures present within the dataset used. As such, it does not cover information which is not present in the dataset, such as the use of Islamic finance, the cash flow of the business and the experience of the business owners. Furthermore, this study is limited to Malaysian SMEs and its results are reflective of the operating conditions for Malaysian SMEs.

1.5 Significance of the Study

This study is significant because it frames SME risk from a financial perspective and stands it apart from the common discourse of default risk that permeates so much of SME literature. The risk of defaulting is still referred to but it is re-interpreted as a probability of survival. The analysis of different aspects of SME

characteristics help to create a more holistic picture of the factors which affect SME risk.

Setting the study in Malaysia allows for the testing of these characteristics in a Malaysian context. This is of interest to studies regarding Malaysian SMEs for the following reasons:

1. SMEs are an important aspect of Malaysian economy. In 2014, SMEs in Malaysia contributed to 35.9% of GDP and employed 65% of the total population of Malaysia. These amounts are representative of Malaysia as a developing nation where SMEs contribute more to the economy as compared to more stable developed countries. The results from this study can provide better information for use by policy makers in helping grow Malaysian SMEs.
2. Malaysia practices affirmative action policies targeted to the majority Bumiputra ethnicity. These affirmative action policies are framed as the 'special rights' accorded to the Bumiputra as natives of the land in the Malaysian constitution. These special rights amount to subsidised business loans, Bumiputra-only government contracts and a Bumiputra special equity distribution for publicly listed companies, to name a few. These rights are purported to give Bumiputras an extra hand in business, given that the Malaysian economic sector is still dominated by ethnic Malaysian Chinese businesses. Because of the economic dominance of the Chinese, many Bumiputra believe these special rights need to be safeguarded, which in turn causes friction between the two communities (Gomez, 2007, 2012). Studying the impact that ethnicity has on SME risk will be an interesting discussion point in this research, given its Malaysian context.

This study is also significant because of its use of panel data from SMEs. This data can often be difficult to source for on a large scale. The utilisation of the dynamic panel data system GMM also underscores the importance of the mitigation of endogeneity in analysing SME data, given that the inter-relationships between SME variables can give rise to instances of loop causality as the variables arise from measurements used within the same business context.

By measuring SME risk from the perspective of the returns to the investor, this research lays the groundwork for a framework of valuing SME risk and return. The analysis of the relationship between SME risk and its financial, owner and firm characteristics gives this research additional insight into the factors which cause SME risk and the factors that do not. This insight is important because it allows for better allocation of resources to areas of the business that are crucial in obtaining th investor's required return on their investment into the SME.

1.6 Major Contributions

This study makes major contributions in three key areas which are:

1.6.1 Comparing the usage of different risk measures

This study analyses the use of the Pure-play beta, Accounting beta and the Survival method in a database of Malaysian SMEs. Each measure is designed to calculate financial SME risk and represents the volatility in return that can be expected by their owner. This volatility can then be further translated into the required rate of return for owners investing in their businesses.

This study contributes in this area by comparing the application of these different risk measures to a panel dataset of SMEs. This ensures the consistency of the results and demonstrates the usage of these risk measures to a dataset containing SME

financial data. By calculating these different risk measures and comparing them against each other through correlation testing and the discernment of the qualitative implications of their different values, this study contributes to the better understanding of how financial risk is priced. Attention is given to how each calculation is derived and why the values are different, adding to the literature regarding these different risk measures.

1.6.2 Examining the relationship between SME risk and characteristics

Most literature surrounding SME risk often deal with non-financial risk, with an emphasis on the internal and external factors that affect the SME operations (Blasco-Ruiz, Guaita-Pradas, & Postiguillo-Garcia, 2016; Falkner & Hiebl, 2015; Howard & Jawahar, 2002; D. D. Wu & Olson, 2009). This research takes an approach towards testing the relationship between these factors (which the research refers to as 'characteristics') and financial estimations of risk.

While many of these characteristics (geographic location, profitability and ethnicity) have shown to have some impact on the SME's performance, growth and capital structure (Forte, Barros, & Nakamura, 2013; Gomez, 2012; Hanson, 2005a; Turley & Chebat, 2002), studies examining the relationship between these characteristics and SME risk are few, if any. This research looks at how these multiple measures of risk are affected by these characteristics with the aim of creating a better understanding of how risk and return is priced based on the impact of these different SME characteristics.

1.6.3 Enhancing the decision-making process surrounding SMEs

By researching the usage of financial risk estimation methods for SMEs and the relationship between SME risk and SME characteristics, this research contributes towards enhancing the SME and SME-related decision-making process.

The identification of key characteristics which affect SME risk helps to pinpoint crucial areas which SME owners can improve or mitigate. It also provides policy makers with an insight into the areas relating to SME development that require more attention. The comparison of the usage of the different SME risk measures helps to demonstrate the usage of these measures with real-life data. This provides useful examples for SME owners and SME stakeholders to implement in calculating SME risk and return.

SMEs are the backbone of many nation's economies and play an important role in generating local economic activity. Having an additional means of evaluating risk and return is important to both SME owners and policy-makers alike.

1.7 Summary of key findings

This research compares the various risk measures used in the literature and analyses their relationship with SME characteristics. This research finds that the pure-play beta has the highest number of correlations with other numerical variables used in the research, providing some support to its ability to strongly predict the performance of the other variables based on its values. The probability of survival model is developed based on the work of Abdullah et.al (2015) and the probability of survival model 1 is shown to also be highly correlated with other numerical variables in the research, although not as many as the pure-play beta.

The result of the GMM regressions indicate that there is a significant relationship between profitability and risk. There is also support for a significant relationship between capital structure and risk as well. Interestingly, the gender of the business owners also affect the risk faced by the SME, indicating that female business owners are significantly more at risk as compared to their male counterparts. Owner age, used as a proxy for experience is significantly related to risk as well, indicating that older business owners are more likely to have their business survive as compared to younger owners.

There are some interesting non-significant relationships as well. The first one is the lack of any relationship between firm size and firm age with risk, indicating that larger and older firms are not significantly less risky than smaller firms, as per popular belief. The results also indicate no relationship between the location of the business and risk, meaning that urban centres are no less risky than non-urban areas for businesses. Ethnicity does not affect risk, and this is an important finding as given the policy of affirmative action for the Bumiputra (natives) of Malaysia, and the economic dominance of the ethnic Chinese, their race does not confer them any advantages when it comes to operating a business in Malaysia.

1.8 Structure of the Thesis

This thesis is organised as follows. The first chapter covers the background of the study, and provides an explanation of the problem statement and the significance of the study together with the research questions,objectives and major contributions of the study.

The second chapter is the literature review which discusses the operations of SMEs in Malaysia. It also gives a brief overview of the selection of Malaysia as the

country in which the sample study is based. An explanation of the economic situation in Malaysia as well as the socio-political issues that surround it is given as well. This chapter also includes the history of SME research and the different definitions used for SMEs. Policies that affect SMEs around the world are also discussed, with attention given to financial and developmental policies. The presence of agency cost in SMEs is also discussed, along with the impact that principal-principal agency cost has on the business. The literature review also deals with the calculation of business risk and return, reviewing the history of risk and return calculation models, from the seminal work done by William Sharpe on the Capital Asset Pricing Model (CAPM) to the creation of business survival scores such as Altman's Z score model. The different methods of calculating beta and the challenges associated with their calculations are highlighted.

Chapter three identifies different SME characteristics outlined in the literature. The chapter focuses on the ways in which these characteristics can affect SME risk. Both financial and non-financial characteristics are investigated. While there are several characteristics that can potentially affect SME risk, only some are chosen, due to the constraints of the database used in this research. This chapters stands apart from the literature review because it serves as a primer to the

Chapter four looks at the data and methods applied to the dataset to arrive at the final number of observations used in the regression. An explanation of the methods used in data cleaning, together with the appropriate justifications for the cleaning processes are outlined. The GMM model and the dynamic panel GMM estimator are explained in greater detail. A brief history of the use of GMM in financial reserach is provided. The SME characteristics identified in chapter 5 are used as the basis for the hypotheses developed in this chapter.

Chapter five shares the results and discussion of the study. Using lag variables to serve as instrumental variables in the regression, the dynamic panel GMM estimator is used to determine the relationship between the dependent and independent variables. The significance of each relationship is analysed as is the direction of each relationship. The findings are discussed in relation to prior literature to facilitate a progression of knowledge and identify areas of similarities, differences and the implications of the findings.

Chapter six concludes the thesis, revisiting the focus of the study and providing an overview of the empirical results and discussion. It also highlights the contribution this study has made to the literature and the implications this knowledge has for policy and decision making regarding SMEs. The limitations of the study are discussed and suggestions for future research are presented.

1.9 Chapter Summary

SMEs face a high turnover rate. In Malaysia, 60% of all SMEs fail within the first 5 years of operation. SMEs around the world face failure rates of more than 50% within the first 5 years. Governments around the world recognise the importance of safeguarding and promoting the development of SMEs and as a result, there are many policies, finance schemes, training initiatives and economic activities geared towards the development of SMEs in several countries around the world.

The analysis of SME risk and the understanding of how that risk is valued is an area which is still poorly understood. Having poor information on a crucial aspect of SME operation can potentially lead to mismanagement of the business, or even failure. A better understanding of how risk is priced into SME operations and the

factors affecting that risk is needed to facilitate better decision-making and resource allocation in SME management.

This study proposes a means of calculating that risk via pure-play beta and analyses the relationship between SME risk and its financial and non-financial characteristics. This is done to create greater awareness regarding the valuation of SME risk and the factors that can affect that risk.

2 Literature Review

2.1 Introduction

The literature review is broadly divided into three sections. The first section deals with an overview of the country in which this study is placed, Malaysia. This section discusses a brief history of the country and the economic operating conditions of the country. The literature selected in this section helps to outline the background for the study and it provides and insightful perspective into the features which define Malaysia. This section also aims to illustrate the operating conditions for SMEs in Malaysia and the various initiative provided for their development.This perspective allows for a more objective comparison when generalising results from this study to other countries.

The second section deals with SME risk and governance. The second section higlights the importance of SMEs to their countries and supports the argument for measuring risk in SMEs using literature which talks about some of the unique risks facing SMEs. As many SMEs are family-owned businesses, this section will discuss how the governance structure of SMEs creates risk in the company. This section

also elaborates upon the different operating structure of SMEs and the challenges it holds for SME owners.

The third section looks at the calculation of risk and return and how it relates to SMEs. This section begins by discussing the evolution of the risk and return models over the years and highlights some of the different ways risk and return is calculated in the literature. Attention is given to measures which show a compatibility with estimating risk within unlisted SMEs. It is from these selection of measures that the measurements of risk used in this research are derived.

2.2 A Brief Overview of Malaysia

On August 31, 1957, the Federation of Malaya (consisting of the nine Malay states and two British Straits Settlements, Penang and Malacca) gained independence from the British Empire. On 16 September 1963, the Federation of Malaya was joined by the states of North Borneo (Sabah) ,Sarawak and Singapore forming the nation-state now known as Malaysia (Singapore would later be expelled from the country in 1965). Since independence, Malaysia has undergone rapid growth from an agricultural-based economy to a heavily industrialised one (Ahmad, Wilson, & Kummerow, 2011; Madanchian, Hussein, Noordin, & Taherdoost, 2015; Zuhdi & Mohamed Naim, 2015). In the 1990s, it enjoyed a period of high growth and development thanks to a boom in the electronics manufacturing sector and became known as one of the 'Asian Tiger Economies'. However, in 1998, the East Asian financial crisis dealt a huge blow to the Malaysian economy, and slowed down growth considerably (Saleh & Ndubisi, 2006). Malaysia's most recent GDP stands at USD 309.86 billion, placing it fourth in the South-east Asian region behind larger countries such as the Philippines, Thailand and Indonesia.

Malaysia is a multi-cultural and multi-ethnic country with three predominant ethnicities: the majority group is Bumiputra (sons of the soil – Malaysia's indigenous population) and there are also ethnic Chinese and Indians who migrated to Malaysia over the course of several generations (Sandha & Singh, 2007). The Bumiputra ethnicity is further divided into sub-ethnic groupings, the largest of which is the Malay, who are predominantly Muslim. Other sub-ethnic groupings include the Orang Asli and tribes indigenous to Sabah and Sarawak such as the Iban, Kadazan, Murut, Penan and Kelabit. Race serves a very important social function in Malaysia as cultures and mannerisms are largely governed by ethnic cultural expectations and each racial group makes an effort to preserve these practices. As a result, political parties are often organised along racial lines (Gomez, 2003). The current ruling coalition is an amalgamation of different race-based parties, nominally led by the United Malays National Organisation (UMNO).

Malaysia is a constitutional monarchy and the Malaysian High King, known as the Yang-DiPertuan Agong (Agong) is the appointed head of state. The position of the Agong is rotated between Malaysia's nine Malay Royal families, which are the respective rulers of nine different states (Selangor, Kedah, Kelantan, Terengganu, Perlis, Johor, Pahang, Negri Sembilan and Perak) once every five years. The special position accorded to Malay Rulers is enshrined within the Malaysian constitution and has afforded the Malays political dominance in Malaysia. This special position extends to the recognition of Islam (being intrinsically linked to Malay culture) as the official religion of Malaysia and Bahasa Malaysia (which is based on the Malay language) as the official language of Malaysia.

In terms of ease of doing business, Malaysia ranks no. 23 in the world and no. 4 in the East Asia and Pacific region, making it a favourable destination for investors

(World Bank, 2017a). The modern Malaysian economy is heavily dependent on its petroleum reserves and changes in the price of crude oil have a pronounced effect on Malaysian economic performance (Solarin & Shahbaz, 2015). The Malaysian National Petroleum and Gas company, Petronas, is responsible for the management of the nation's oil reserves. Apart from petroleum, Malaysia is also one of the largest producers of palm oil in the world. Oil palm plantations in Malaysia are largely owned by Sime-Darby GSC. Oil palm is used in a wide variety of industries from construction and manufacturing to food production.

Malaysian SMEs often work together with larger businesses in sectors such as petroleum and oil palm production and often perform ancillary services such as maintenance, cleaning or third-party support services (Saleh & Ndubisi, 2006; SME Corporation Malaysia, 2015). The presence of lucrative resource-based industries in Malaysia has allowed for the growth of SMEs built around these industries and has created a robust pool of SMEs in the nation.

2.3 Economic Activity of Malaysian SMEs

As of 2014, SMEs contributed 35.9% of Malaysia's GDP and employed 65% of the total employed workforce (SME Corporation Malaysia, 2015). SMEs in the service sector contributed 58.6% of the SME GDP contribution in 2014, followed by SMEs in the manufacturing sector at 21.7% (SME Corporation Malaysia, 2015).

Service activities have shaped SME development policies in Malaysia. Currently, franchising is being heavily promoted as a means for service-oriented businesses to further expand their markets and grow economically (SME Corporation Malaysia, 2015). Manufacturing is also an important economic activity for SMEs in Malaysia. In 2014, 18.1% of SME manufacturing activities were metal- and mineral-related

fabrication processes and 35.4% were other manufacturing activities, such as electronics and components (SME Corporation Malaysia, 2015).

Malaysia still has a robust agricultural sector, with agricultural SMEs contributing 12.4% of the SME GDP contribution in 2014. While there are some agricultural SMEs involved in livestock and farming activities (4.7%), forestry and logging remains the predominant activity of agricultural SMEs in Malaysia (78.1%). The diversity of economic activities of Malaysian SMEs has led to the formation of different strategies and policies aimed towards developing these SMEs. The establishment of the National SME Development Council (NSDC) in 2004 helped to plan and chart the growth of Malaysian SMEs. A strong emphasis on building quality exports and innovative technology has shaped many of the SME-related policies in the country. There is also a strong focus on the strengthening of regional business networks with other countries in the Southeast Asian region (ASEAN). A total of RM 12. 1 billion (USD 2.9 billion) was allocated by the government in the 2015 budget towards developing SMEs (SME Corporation Malaysia, 2015).

Most economic activities involving SMEs are concentrated on the Malaysian peninsula (known as West Malaysia) where Kuala Lumpur (KL) and its surrounding regions are located (Koen, Asada, Nixon, Habeeb Rahuman, & Mohd Arif, 2017; Madanchian et al., 2015). The area surrounding KL is known colloquially as the Klang Valley, or Greater KL. It is a highly developed and industrialised zone, and is home to many SMEs that specialise in manufacturing and manufacturing support services. In terms of development, East Malaysia, which is made up of the states of Sabah and Sarawak, lags behind West Malaysia. Although the state of Sabah has valuable deposits of petroleum and natural gas along its coastline, only 5.9 percent of oil and gas revenues are spent on developing

Sabah, leaving it one of the poorest states in Malaysia (Martin, Boily, & Lariviere, 2016; Mat, Mansur, & Mahmud, 2015). Sarawak also has natural resources such as bauxite mines and natural timber, but it also ranks as one of the poorest states in Malaysia (Martin et al., 2016). The inhabitants of Sabah and Sarawak live in relative poverty compared to their countrymen living in Greater KL and researchers have suggested approaches such as eco-tourism and investment in developing human capital in order to remedy the situation (Ahmad & Mara, 2014; Mat et al., 2015). This is not to say that all states in West Malaysia are wealthy, as the poorest state in Malaysia is the state of Kelantan, which is located on the East Coast of the Malaysian peninsula (Martin et al., 2016). Businesses operating in Kelantan often face significant challenges in terms of accessing finance and opportunities. A lack of market growth and a dwindling number of customers due to migration to other parts of the country have led to a slump in Kelantanese businesses (Aziz, Awang, & Zaiton, 2012). While most SMEs are based in the Greater KL area, it is still important to consider the different economic conditions that other Malaysian SMEs operate in to gain a better understanding of the overall picture of Malaysian SMEs.

There is a strong support from the Malaysian authorities to continue developing SME activities in all regions in Malaysia, which helps to improve their survivability. The diverse economic activities and robust contribution of Malaysian SMEs to the national GDP provide a fertile and generalizable ground for research and analysis of the financial trends that affect SMEs.

2.3.1 Ownership of Malaysian SMEs

About 60-70% of SMEs in Malaysia are family owned. There is a high level of concentration of ownership in the hands of one party among Malaysian SMEs. The largest shareholders are often members of the same family, with the head of the

family often holding the highest level of shares (Rachagan & Satkunasingam, 2009). Families that own Malaysian SMEs also have a tendency to retain control of the company even after the company has grown larger and become listed (Ibrahim & Samad, 2011). This often creates a situation where the manager of the company is also one of the major shareholders, which is referred to as managerial ownership (Ibrahim & Samad, 2011). Managerial ownership can reduce the incidence of earnings management and income smoothing as the interests of the management and the major shareholders are aligned and the agency cost between the two parties is virtually non-existent (Ali, Salleh, & Hassan, 2010; Ibrahim & Samad, 2011). However, having concentrated ownership often means that when the leader of the family dies, a tussle for the leadership of the company often ensues, with siblings and cousins pitted against one another, which sometimes leads to the dissolution of the company or its acquisition by a competitor, creating threats to the survival of the business and affecting its risk (Gomez, 2003, 2007).

Businesses in Malaysia are also closely linked with political patronage. Businesses enjoy greater access to opportunities if they are linked to particular figures in power. Johnson and Mitton (2006) found that in times of political upheaval, businesses with known connections to the ruling Prime Minister faced downward slumps in terms of their share prices, as if in anticipation of reduced subsidies. The Malay Royalty also have several business interests in the country (Reuters, 2014) and the current Johor state Sultan has made significant investment in the new Iskandar Development Region (which is named after the previous Sultan of Johor, his predecessor) in order to boost the economic prospects of his own state (Bhaskaran, 2009).

SMEs in Malaysia thus operate in an environment where relationships with members of the ruling class are very important to business survival. As such, relationships are often cultivated between family members and rulers, which can sometimes result in a conflict of interest over business direction and decision making (Gomez, 2003, 2012). This can lead to potential risks for business investors through agency costs, which can arise as a result of poor corporate governance.

2.3.2 Corporate Governance of Malaysian SMEs

Agency costs arise when there is a conflict of interest between the principals (the owners of the business) and the agents (the managers of the business) (Jensen & Meckling, 1976). When the owners and managers are the same party, their goals align and in theory, agency cost is eliminated (Jensen & Meckling, 1976; Schulze, Lubatkin, Dino, & Bucholtz, 2001). However, a different form of agency problem arises in the operation of family-owned businesses; this is the agency problem that lies between the majority shareholders (the controlling family) and the minority shareholders (other investors) (Rachagan & Satkunasingam, 2009). There is very little recourse for minority shareholders if they are oppressed by the majority shareholders. In board meetings, there is not much that can be done to prevent the majority shareholders from carrying out unethical actions such as related party transactions with businesses connected to the controlling family. However, there are certain instances where the minority shareholders can seek redress against the majority shareholders. These include instances of fraud, decisions that require a special majority, and decisions that affect the wellbeing of individual shareholders (Rachagan & Satkunasingam, 2009).

Malaysian SME owners engage in corporate social responsibility (CSR) activities regularly, such as organising charitable events, looking after employee welfare, and

maintaining good supplier relationships. In their research on the reasons why Malaysian SME owners engage in CSR, Nejati and Amran (2009) find that economic pragmatism does not motivate Malaysian SME owners to engage in CSR; instead, altruism plays a bigger role. This altruism is often motivated by religious beliefs and a desire to give back to the community that SMEs are a part of, reflecting the overall conservative tendencies of the Malaysian populace in general. These conservative tendencies also stem from ethnic-based religious beliefs, which result in some Malaysian business owners (Bumiputra Muslims in particular) having a lower risk appetite compared to other Malaysian business counterparts (Gomez, 2012).

2.3.3 Ethnicity and Positive Discrimination

Prior to the independence of Malaysia in 1957, the British adminstration practiced a policy that hampered the Bumiputra (sons of the soil), the indigenous people of Malaysia, from owning and developing land, limiting them only to paddy fields and aquaculture (Gomez, 2003). While the Bumiputra (the majority of whom are Malay) were allowed to own land and pass it down from generation to generation, this land mostly remained undeveloped in the early stages of independence. This created an environment post-independence where the Bumiputra were left behind economically compared to the other ethnicities, most notably the Chinese (Gomez, 2003; Whah, 2010). On May 13 1969 a string of racial riots across Kuala Lumpur caused the Malaysian government to rethink their economic policies which led to the formation of the New Economic Policy (NEP) in the 1970s, which focused on eliminating poverty and reducing the income gap between ethnicities. Through the NEP, the People's Trust Council, known by its Malaysian acronym, MARA, was established to provide financial and social support to the Bumiputra. The Federal

Land Development Authority (FELDA) was also established to allow rural Malaysians (primarily Bumiputra) a means to own land by developing plots of undeveloped land. In the 1990s, the NEP was replaced by the National Development Policy (NDP) which continued some of the policies of the NEP. The NEP and the NDP have largely been successful in creating a strong Bumiputra middle-class and a number of Bumiputra entrepreneurs. However, even now, Malaysian Chinese are still economically stronger despite the affirmative action policies carried out under the NEP/NDP (Gomez, 2003, 2012). The affirmative action policies have led to some Chinese businesses obtaining exclusive Bumiputra-only contracts by sub-contracting them from Bumiputra middlemen called 'ali babas', leading to rampant rent-seeking among a number of Bumiputra entrepreneurs (Gomez, 2003). However, the majority of partnerships for SMEs in Malaysia do not result from intra-ethnic partnerships; rather the partnerships are forged between different ethnicities, with a growing number of Malay-Chinese partnerships emerging. These partnerships also seem to be on an equal footing and not 'ali baba' arrangements (Gomez, 2003). As Malaysia grows as a nation, the sense of national identity grows stronger and ethnic differences may play a lesser role in the future. Observers have noted that the continuance of the affirmative action policies may cause the Bumiputra to become reliant on government assistance and may affect their entrepreneurial orientation in the future (Awang et al., 2009; Zainol & Daud, 2011). The presence of affirmative action in Malaysia, favouring members of the Bumiputra ethnicity, creates imbalances in business opportunities. This means that the ethnicity of the business owners can affect the risk of Malaysian SMEs.

2.3.4 Islamic Finance in Malaysia

Malaysia is a majority Muslim country and has a thriving Islamic finance industry. Islamic finance in Malaysia began in the 1960s with the establishment of the Pilgrimage fund (Tabung Haji [TH]), which was created for the sole purpose of providing Muslims with a way of saving funds they could then use for their pilgrimages to the Holy Muslim city of Mecca. The TH provides interest-free savings (in accordance with Islamic Shariah law) and distrbutes profits to all who hold savings accounts with TH. The funds obtained are invested in Shariah-compliant portfolios (Shariah-compliant portfolios do not invest in finance, gaming, liquor, firearms, or tobacco-related industries) in order to generate a return to the savings holders (Laldin, 2008). In the 1980s, the first Islamic bank was set up in Malaysia (Bank Islam) and in 1999, the second Islamic Bank was set up (Muamalat Bank). Foreign Islamic banks such as Al-Rajhi and the Kuwait Finance House have also set up operations in Malaysia. Conventional banks have also been allowed to create Islamic Finance 'windows', which allow them to trade in Islamic financial products. However, the regulations put forward by the Shariah advisory council prohibit the co-mingling of assets between the Islamic and Conventional divisions of these conventional banks (Laldin, 2008).

Principles of Islamic finance in Malaysia revolve around the prohibition of usury, uncertainties and gambling. Thus, according to Islamic priniciples, conventional finance and insurance policies are deemed to be 'haram' or non-permissible for consumption by Muslims (Awang et al., 2016; Hassan & Latiff, 2009; Hearn, Piesse, & Strange, 2012). Because of this, Islamic finance was developed as a means of delivering conventional financial services to observing Muslims, which works around the rules of Islamic jurisprudence in order to deliver a financial product that

is deemed to be 'halal' or permissible. To this end, some researchers have suggested that halal food manufacturers should also adhere to Islamic financial principles in order to market their food products as being purely halal (Awang et al., 2016). Perceptions that SMEs have about the use of Islamic finance is also an area of interest, with many SME employees indicating that their choice to use Islamic finance is based strongly on religious obligation as opposed to Islamic finance being cheaper and/or having better returns than conventional finance (Jaffar & Musa, 2014). Interestingly, the development of Islamic financial policy in Malaysia is driven largely by the need to cater to the religious needs of the local Muslim population and has since expanded to cater to foreign clients as well. In comparison, Singapore has an Islamic financial policy that uses Shariah principles in order to provide an extra layer of due diligence over financial contracts, thus using Islamic principles for risk reduction in finance (Lai & Samers, 2017). In a study conducted over 18 Muslim-majority countries, of which Malaysia is one, Johnes, Izzeldin, & Pappas (2014) found that while Islamic banks operate more conservatively than conventional banks, on the average, there are no significant differences in terms of returns and performance between Islamic and conventional banks.

Malaysia is one of the biggest hubs of Islamic finance in the world, with many Malaysian companies using Islamic financial instruments, even those owned by non-Muslims (Boocock & Presley, 1993; Laldin, 2008). Malaysia currently practices a dual-banking system which caters to both conventional and Islamic markets. However in Malaysia, there is no clear indicator of whether Islamic finance is preferable to conventional finance, religious views notwithstanding. In the future there may be a greater effort to codify Islamic financial practices or a movement to a more holistic Islamic-based financial system (Laldin, 2008). The

growth of Islamic banking and its use by Malaysian SMEs may reduce the amount of risk, due to the conservative nature of investments espoused by Islamic finance, providing a lower risk profile as compared to other SMEs.

2.3.5 Financial Inititatives and Support for SMEs in Malaysia

Since the creation of the NEP in the 1970s, several financial initiatives and financial institutions have been established to assist Malaysian SMEs in developing their capacities and engaging with the global market. From a venture capital perspective, Malaysia has the Cradle Investment Fund, which invests up to RM500,000 as start-up seed funding, and the Malaysian Venture Capital association (MAVCAP) which provides funding from start-up to the mezzanine stages of SMEs (Wonglimpiyarat, 2011). Research grants are also provided to stimulate product development and technological enhancement in Malaysian industries. These grants include Federal Research Grants, Science Funds and Techno Funds (Wonglimpiyarat, 2011). For the Bumiputra, financing initiatives under the affirmative action policies brought about by the NEP include low-interest MARA loans and various government grants (Abdullah & Muhammad, 2008). Efforts to develop entrepreneurship amongst youth have led to the development of Graduate Seed Funds and Graduate Entrepreneurship Development programmes (Che Ibrahim, 2009; SME Corp & Mybajet, 2012; Zainal Abidin & Bakar, 2005). In order to monitor the development of SMEs in Malaysia, the SME Development Council (SMIDEC) was set up in the 1990s (in 2009 they changed their name to SME Corp) (Zulkifli-Muhammad, Char, Yasoa, & Hassan, 2009). The SME Bank was set up in the 2000s with the purpose of providing loans to meet the working capital needs of Malaysian SMEs (Zulkifli-Muhammad et al., 2009).

These initiatives include government credit guarantees, low-interest SME loans and business skill training for SME owners, which are aimed at all Malaysians regardless of their ethnicity (Abdullah & Muhammad, 2008; Zulkifli-Muhammad et al., 2009). Most recently, SME Corp has updated their definition of SMEs to reflect the economic developments of price inflation, structural changes and changes in business trends, which have taken place since the last update in 2005. The latest update defines an SME (micro businesses are also included in this definition) as a business with an annual sales turnover between RM 300,000 and RM 20 Million or between 1 and 75 full-time employees for SMEs in the services sector and an annual sales turnover between RM 300,000 and RM 50 Million or between 1 and 200 full-time employees for SMEs in the manufacturing sector (SME Corporation Malaysia, 2013b).

2.4 The Importance of SMEs

SMEs are important for their contribution to their nation's economy and GDP. Accurate pricing of risk and return maximises the efficiency of resource use. This leads to investment security for lenders, creditors and investors. More than 99% of registered businesses in many countries around the world are SMEs, including developed countries such as Germany (Britzelmaier et al., 2013), developing economies like Indonesia (Kuncoro, 2008) and newly industrialised countries like Malaysia (Mohd Aris, 2007). SMEs are also seen as engines of economic growth, employing a significant portion of the workforce and contributing to their nation's GDP (Ardic et al., 2012; Ariff & Abubakar, 2002; Botelho & Bourguignon, 2011). In Malaysia, as of 2014, SMEs contributed 35.9% of the Malaysian GDP (SME Corporation Malaysia, 2015). Since the 2000s, countries around the world have begun to devote more attention to the development of their local SMEs,

acknowledging the important role that they play in the national economy (Britzelmaier et al., 2013).

SMEs are also big employers in their respective countries. In Malaysia, 97.3% of enterprises are categorised as SMEs and employ up to 65% of the Malaysian working population (SME Corporation Malaysia, 2013a, 2015). If SME risk is not understood then employees may migrate to larger companies, undermining the development of SMEs and their potential to contribute to future economic growth. In recognition of the importance of SMEs, governments around the world have instituted measures to assist these businesses through grants, government-backed venture capital, debt relief and credit guarantees (Ariff & Abubakar, 2002; Botelho & Bourguignon, 2011; Britzelmaier et al., 2013; Ingrassia, 2012; Ruth Helen Samujh, Twiname, & Reutemann, 2012).

SMEs fill an important function in society; they represent the engines of growth of the economy and provide a large source of employment. An entrepreneurial culture is important for the development of a nation's economy and nowhere is it better represented than through the successful operation and growth of a nation's SMEs. SME owners undertake a significant amount of risk in managing and setting up a business. Running a business either alone or with minimal staff is challenging (Davila & Foster, 2007; Verheul & Thurik, 2001). Difficult access to capital and a lack of awareness regarding the pricing of risk associated with the required return to their financiers can cause SME failures and represents an opportunity cost to the nation in terms of future income lost (J. S. Ang, 1991; Bruno, Leidecker, & Harder, 1987; Everett & Watson, 1998). Heaton (1998) has pointed out that SMEs are different from larger businesses as they have a greater need for working capital finance and they operate in an environment that is opaque.

2.5 SMEs and risk

Risk, according to financial theory, is defined as the volatility associated with the returns on an investment. It is often characterised by the movement of a security's price (stock price) on the stock market. The greater the magnitude of its movement (either upwards or downwards) the greater its risk (Jensen, 1968; Sharpe, 1964). In the 1960s it was argued that diversification allowed investors to minimise the unsystematic risk associated with the investment or purchase of a stock, therefore the only relevant risk to the investor (assuming they control a diverse portfolio of assets) is how the systematic risk (otherwise known as the financial beta) endemic to the market is reflected in the price of the security in the stock market (Jensen, 1968; Sharpe, 1966; Treynor, 1965b). However, when considering the case of the SME, the vast majority of which are unlisted, applying a market-based approach to calculating risk for these companies can be difficult. From an SME owner's perspective, they are not concerned with the overall performance of their business in a portfolio of investments; rather, the main concern for many SME owners is the continued survival of the business (Moro & Nolte, 2012; Tucker, Matsumura, & Subramanyam, 2003). Risk, from an SME perspective, is often closely tied to the survivability of a business and the different factors relating to the probability of business failure. Researchers have developed several methods to estimate the probability of business failure, with the objective of giving SME owners and creditors a means of monitoring and measuring SME longevity (Altman & Sabato, 2007; Gaskill et al., 1993; Marom & Lussier, 2014).

Information on SME survivability is usually of great interest to financial institutions that provide loans to SMEs. This is especially prevalent with the development of credit rating scores, which are widely used by lenders to determine the credit-

worthiness of an SME (Berger & Frame, 2007; Berger & Udell, 2002; Marcus, 2004). To banks, the risk associated with investing in SMEs is the potential that the SME may not be able to meet their financial obligations in terms of interest payments. Conversely, the risk of an SME being unable to service its financial obligations can result in bankruptcy proceedings instituted against the SME, cutting short its operational lifespan. To this end, several researchers have also considered the risk of bankruptcy for SMEs in making financial decisions for SMEs (Dichev, 1998; Kwansa & Cho, 1995; Platt & Platt, 1991). Sometimes the strict credit scores used by the financial industry push SME owners into unconventional streams of finance, such as borrowing from friends and family, boot-strapping and even loan sharks, creating additional risks to the SME owner (Bylander, 2014; Neely & Van Auken, 2012; Prina, 2015; Sanchez-Barrios, Giraldo, Khalik, & Manjarres, 2015; Soudijn & Zhang, 2013).

Researchers have been working on different methods to bridge the gap between these different risk perspectives as SMEs continue to play prominent roles in their local economies. SME risk research is often concerned with how these different perspectives can be used together in developing a more holistic overview of SME risk.

SMEs were recognised as risky entities as early as the 1970s. In an effort to recognise the risk of SME failures, Edmister (1972) proposes the use of financial ratios to predict the likelihood of SME failures. The research found that the closer the financial ratios used for prediction are to the actual failure date, the more accurate the results. However, this research was reflective of views at the time that SMEs were operationally risky, but that their risk purely came from external sources.

Echoing this view, Jensen and Meckling (1976), for example, noted that in their research of agency cost in businesses, agency costs arising from the conflict between the owners of a business and the managers responsible for running a business did not exist in a small, family owned and managed business. Therefore, much of the early research on risk and return was heavily geared towards large, publicly listed companies because of the view that SMEs simply had too small a magnitude of risk to be of interest (Black, 1972; Sharpe, 1964; Treynor & Black, 1973). Combined with the fact that SME securities are not publicly listed, creating information gaps for researchers, the issue of SME risk remained largely untouched.

In the 1980s, a greater acknowledgement of the contribution made by SMEs to national economies was made by authors such as Lewis and Churchill (1987), who outline the five stages of SME growth: existence, survival, success, take-off and resource maturity. Hollman et al. (1984) propose risk management procedures for SMEs, which consist of steps and controls that can be taken by SME owners to manage the risks faced by their SMEs. In the same vein, d'Amboise and Muldowney (1988) propose a unique management theory and approach towards managing SMEs, cognizant of the fact that SMEs operate on different levels to larger businesses and face different sets of risks.

Studies on SME failures became more popular in the 1990s, with many studies on the factors in and causes of SME failure (Everett & Watson, 1998; Gaskill et al., 1993; McDougall, Oviatt, Shrader, & Simon, 1993). It was during this period that risk evaluation methods previously used for large, publicly listed companies were seen as potential means to evaluate SME risk. Cost of capital calculations, based on the weighted average cost of equity and cost of debt, were suggested as potential means to calculate SME risk (Cheung, 1999; Diamond & Verrecchia, 1991; Heaton,

1998). Heaton (1998) argues that it is possible to calculate the cost of capital for SMEs to evaluate their risk but the difficulty lies in the fact that it is difficult to gain access to the relevant market information required to calculate SMEs' cost of capital. A possible solution to this problem was suggested by Cheung (1999) who proposes that, using the probability of business failure as an input, one is able to value an SME's cost of equity (which forms part of the cost of capital calculation). Guenther and Willenborg (1999) suggest that there is a link between capital gains taxes and the cost of capital of SMEs; however, the SMEs used in their studies were companies that had just completed their IPO (initial public offering) and been listed on the stock exchange, unlike the majority of SMEs, which are unlisted.

From the beginning of the new millenium, more research was devoted towards predicting SME failure. Altman and Sabato (2007) examine the implementation of the Z-score model for SMEs in the USA. The Z-score model was initially developed to predict the survivability of publicly-listed companies. By using the financial ratios of a sample of SMEs in the USA, Altman and Sabato were able to develop a modified Z-score for use by SMEs. This research was expanded upon by Abdullah et al. (2014) who adapted it for use within a Malaysian context. However their research focused specifically on factors that contribute to business survival and not on the evaluation of risk.

Research into the cost of capital continued as well, with Moro and Nolte (2012) building upon the research of Cheung (1999) and their calculation of the cost of equity for SMEs using the probability of survival. Moro and Nolte add further dimensions to the calculation, including the business owner's historical performance, the amount of personal wealth and the extent to which personal assets are used to secure the business debt. The results of the research have not yet been

tested empirically with a sample of real businesses. Determining the amount of personal finance invested by an owner into their business is tricky because such information is not publicly available. Berger & Udell (1998) find that in the US, credit card finance is used by a small number of business owners as a means of financing their business. However, the majority of business owners in the study borrowed from financial institutions rather than using personal lines of financing. Starting from the 2000s onward, there was a greater recognition of SMEs as risky entities, with many researchers investigating the relationship between SMEs and their providers of finance; most notably, the banks that loan them money (Berger & Udell, 2002; Degryse & Van Cayseele, 2000; Neely & Van Auken, 2012). In an attempt to understand the reasons behind the high turnover of SMEs, many researchers drew a connection between the prevalence of family ownership and the concentration of management and control with the high risks faced by SMEs. However, more recent research suggests that small family businesses do not face agency costs, as espoused by Jensen and Meckling (1976), but rather that there is conflict between the different owners of a business (Braun et al., 2011; De Massis et al., 2014; Gómez-Mejía et al., 2007). This conflict is termed principal-principal agency conflict and it can exist between family members operating a business or between unrelated majority and minority shareholders (Banchit & Locke, 2011; Renders & Gaeremynck, 2012).

As the pool of knowledge on SMEs grows, there is a growing understanding of the factors that affect SME risk, but SME risk itself has not been sufficiently quantified in a way that the relationship between risk and these other factors can be tested. It is important to measure this risk because it arises from conditions that are common

to many SMEs and the first step in mitigating the risks that arise from these factors is to recognise and measure them.

2.6 Ownership and Governance of SMEs

An SME is a dynamic organisation with a structure that shifts and changes as it grows and expands. The literature deals with many examples of how the balance of ownership and control affects SME agency cost, which gives rise to SME risk. In SMEs, the concentration of ownership and control in the hands of one party or family does not eliminate agency cost as suggested by Jensen and Meckling (1976), but it creates opportunities for principal-principal (PP) conflict to arise through conflict between different principals in a business (Rachagan & Satkunasingam, 2009; Renders & Gaeremynck, 2012; Young, Peng, & Bruton, 2003).

Several authors in SME management agree that the concentration of ownership leads to conflicts of interest and a tendency to sacrifice long-term financial gains so that the owner's control can be maintained over the business in the short-term (Gómez-Mejía et al., 2007; Lee, Lim, & Lim, 2003; Memili, Misra, Chang, & Chrisman, 2013). The presence of a dominant controlling influence in SMEs also means that there is often no system of checks and balances to ensure that owner-managers act in the best interests of the SME (Hooi, Wei, & Qian, 2015; Peng & Jiang, 2010; Young, Peng, Ahlstrom, Bruton, & Jiang, 2008).

The most common form of owner-management in an SME is the family controlled SME, which can be susceptible to PP conflict (Gómez-Mejía et al., 2007; Marcus, 2004). SMEs face challenges in managing the business, seeking finance and remaining competitive in their respective economies (Ahmad & Seet, 2009; Everett & Watson, 1998; Watkins, 2007). Added challenges come from family ownership

of the SME as it is usually spread over multiple family individuals, who have varying levels of ownership and control over the business, and varying agendas (Danielson & Scott, 2007; Schulze, Lubatkin, & Dino, 2002). This scattered ownership means that within the family, the control of the business is not as centralised as it might seem to outsiders. There are parties within the family that have more power and control over the business than others, based on their shareholding and their management positions (Shleifer & Vishny, 1986).

An SME owned by a family will try to balance its needs to generate profit with its desire to retain control of the business within the family (Brenes, Madrigal, & Requena, 2011; Gómez-Mejía et al., 2007; Gomez, 2007; Memili et al., 2013). However, this need to maintain control of the business tends to dissipate with each subsequent generation. Gómez-Mejía et al (2007) find that second and third generation olive farm owners are more likely to relinquish control over the business in exchange for more stable returns by joining farming cooperatives. Studying SMEs in the USA, Memili et al. (2013) find that second and third generation family members were more likely to hire non-family managers as compared to first generation family members.

In contrast, in a case study on a large Hong Kong-based manufacturing company, Au, Chiang, Birtch, and Ding (2012) find that the older generation of family members maintain family control of the firm by putting the younger generation of the family members through management school and giving them a small amount of control over various divisions of the parent company. The younger family members will eventually be entrusted with starting their own company as a subsidiary of the parent company, or given full responsibility over a company division. This allows the family to ensure that control and management of the

company stays within the purview of the family. However, this does not stop some members of the younger generation from leaving the company and starting a wholly independent operation of their own.

Typically, when an SME is founded, ownership and control of the company is concentrated in the hands of the founders. When the founders start to bring family members in as shareholders, the business ownership becomes diluted. However, the controlling stake is still typically in the hands of the founder(s) (Schulze et al., 2002; Schulze, Lubatkin, & Dino, 2003b). Founders have considerable influence over business operations and how profits are distributed to other family members. Not all family members will be shareholders of the business as some will be hired to work as employees in various managerial and non-managerial roles (Blanco-Mazagatos, Quevedo-Puente, & Castrillo, 2007; Chua, Chrisman, & Sharma, 2003).

SMEs that wish to expand may need to look externally for sources of finance to fund their business expansion. Founders who are reluctant to relinquish control of the business tend to opt for debt financing over equity financing, which exposes them to higher finance costs and potentially greater risk exposure (Anderson, Mansi, & Reeb, 2003; Ang, Cole, & Lin, 2000; Danielson & Scott, 2007; López-Gracia & Sogorb-Mira, 2008; Paul, Whittam, & Wyper, 2007).

SMEs that opt for equity financing, either because they have exhausted their debt capacity or are unwilling to relinquish control of the business to 'external' parties, often place restrictions on share trading so that the family is still the controlling party of the company and management of the company is still composed of nuclear family members. In developed economic zones such as the European Union, there are laws and institutions to protect the rights of the minority shareholders; however,

this may not always be the case in less developed regions, allowing the controlling party to misappropriate the wealth of the business to the detriment of the minority shareholders (Dharwadkar, George, & Brandes, 2000; Renders & Gaeremynck, 2012; Young et al., 2003).

If an SME continues to grow and the family still maintains a controlling influence, the ownership of the business becomes more dispersed as the children of the siblings of the founding family each hold smaller, shared interests in the company. These relatives may not have the same motivation to run or develop the company as their parents or grandparents did; many of them may have careers or businesses of their own (Schulze et al., 2002; Schulze, Lubatkin, & Dino, 2003a; Shleifer & Vishny, 1986). Due to the dispersion of ownership, more non-related, professionally trained managers may be brought in to run the business, selected on merit rather than on family relationships (Chua et al., 2003; Schulze et al., 2003a). As ownership becomes further dispersed, the responsibility of running the SME's day-to-day activities are handed to business managers, who are now made up of non-family members. This transition from family ownership and control to family ownership with professional managerial control means that the SME becomes exposed to principal-agent (PA) agency conflict, due to the dispersal in ownership and control. It is more difficult for the owners to monitor and control the actions of the management, potentially exposing them to PA agency cost if the management were to commit illegal and unethical transactions to benefit themselves (Leland, 1998; Young et al., 2008).

SMEs are vulnerable to risk at all stages of their growth and it is important for owners, finance providers and policy makers to understand the nature of these conflicts and the risks and costs associated with them. Additionally, the costs

associated with financial distress of an SME can extend to creditors and suppliers, who may potentially lose the SME as a customer if the SME fails (Keasey, Pindado, & Rodrigues, 2014).

SMEs at various stages of growth and development are subject to both PP conflict and PA conflict. A concentration of ownership and control exposes the SME to a wide range of risks from different sources due to PP conflict. As non-family members are introduced into the management team, more opportunities for PA conflict become evident. Risks, as they relate to governance, are often not taken very seriously by SME owners and directors, who often adopt a stance of 'it won't happen to us' until it is too late (Spiers, 2017). Spiers (2017) points out that risk in SMEs is often viewed in the narrow context of operations, sales and finance and SME owners fail to see the larger picture with regard to the causes behind SME risks.

Governance in SMEs is often quite limited compared to their larger counterparts. In some family-owned businesses there is a board of directors in addition to a 'family council', composed of the founding or senior members of the controlling family (Brenes et al., 2011) who provide governance and oversight controls. Brenes et al. (2011) show that listed family businesses that understand the importance of having a board of directors and use their family council in an effective manner perform better in the market when it comes to shoring up investor confidence. Unlisted SMEs, on the other hand, are privately owned and do not need to report to a board of directors for governance purposes (Hewa Wellalage & Locke, 2014; Jackson & Mishra, 2007). For SMEs that are owned by families, governance is defined by the controlling family and often family members are acquiescent to the wishes of the founder or the individual who is currently in charge of the family

business (Chua et al. 2003; Schulze et al. 2003b). This centralisation of ownership and control puts the controlling family in a position of power and influence over the business, allowing their management decisions to go unchecked and thus increasing the SME's risk.

SMEs are set up by family members to increase the socio-economic wealth of the family. But as the business grows and the founding family members grow older, there is a need to raise capital by engaging outside investors and there is also the possibility of hiring professional managers to manage the business in the absence of a qualified family successor (Chua et al., 2003; Lee et al., 2003; Paul et al., 2007). This desire to develop the family's socio-economic wealth can put the controlling family at odds with the needs of the minority investors in the business. Some owner-managers of family businesses have been known to try to justify business expenses made to support their own offspring or ensure that their own relatives receive relatively comfortable positions within the business in order to preserve the family's wealth (Schulze et al., 2001). These actions of 'altruism' can lead to misuse of business funds by the owning-managing family members, which can cause PP agency cost and increase the SME's risk exposure.

2.7 Agency Theory and the SME

The way SME ownership and governance is structured creates many opportunities for agency cost to arise. Agency cost, as a subset of agency theory, as initially envisaged, is concerned with the relationship between principals and their agents. In the case of a business, it is the relationship between the owners as providers of equity finance (the principals) and the business management (the agents) (Eisenhardt, 1989; Yu, 2012). Assuming utility maximisation, both the principals

and the agents will want to progress their respective goals and these may not necessarily coincide. However, in the case of SMEs, the majority of which are family-owned and managed, these goals usually coincide because the owners and the managers are usually the same individual or belong to the same family. Assuming a conventional larger businesss, the agent, being involved in the day-to-day operation of the business, can take advantage of information asymmetry that exists between themselves and the principal. They will have access to information they can use to maximise their own utility at the expense of the principal's wealth (Eisenhardt, 1989; El Ghoul, Guedhami, Ni, Pittman, & Saadi, 2013; Leland, 1998). This constitutues a risk to the principal(s) and this risk manifests in the agency cost which can reduce the wealth of the shareholder (Ang et al., 2000). The agency cost to the principal(s) is made up of the cost of monitoring and bonding the agent, the cost of the inefficiencies that may arise from managerial oversight and the opportunity cost to the principal(s) in terms of wealth lost via agent(s) utility maximisation activities (Jensen & Meckling, 1976). The wealth of the principal(s) is reflected in the required return the principal demands from the agent in the management of their business.

In an SME that is family owned, the line between the principal and the agent is often blurred because of managerial ownership (Ali et al., 2010; Schulze et al., 2001). In such situations, most researchers agree that with higher levels of managerial ownership, the agency cost faced by the business reduces (Ang et al., 2000; Ibrahim & Samad, 2011; Rachagan & Satkunasingam, 2009; Yu, 2012). Rachagan & Satkunasingam (2009) mention, perhaps a little generously, that while the conflict between the managers and shareholders is virtually non-existent in small, family owned busineses, there is still an agency cost between the majority

shareholders and the minority shareholders. This situation is termed principal-principal agency cost. For instance, the majority shareholders (the family that owns the business) can use their superior voting power to veto related-party transactions and reserve the top managerial positions for members of the family, instead of better qualified individuals, creating business inefficiencies.

Jensen and Meckling (1976) outline several situations where agency cost can arise. These include the classic shareholder-management (principal-agency) situation and also other situations where there is a strong part-owner as manager, who uses his/her managerial control to serve his/her own goals. Jensen and Meckling (1976) note that it is difficult to eliminate agency costs entirely and agency cost can only be eliminated if the manager of the business owns 100% of the business, thus eliminating the need for monitoring costs and aligning the utility of the principal with that of the agent. However, even if the owner and the manager are the same individual or come from the same family, PP agency cost can still arise in the following ways:

(1) Related party transactions – where the owner-manager gets the SME to enter into agreements with other businesses associated with or owned by the controlling party, thus increasing the controlling party's wealth. Often these related party transactions are done at a higher-than-market rate (Renders & Gaeremynck, 2012; Ward & Filatotchev, 2010; Young et al., 2008). For example, the controlling owner of company A uses their managerial powers to get company A to purchase supplies from company B , which they are also a controlling owner of, at an inflated rate and pockets a portion of the proceeds.

(2) Tunnelling – where the owner-managers of the company siphon off funds from the business to other businesses that also belong to them (Hewa Wellalage & Locke, 2014; Jensen & Meckling, 1976; Yu, 2012). Tunnelling is closely related to related party transactions whereby the assets of company A are transferred to company B (usually controlled by the same individual who controls company A) via loans, preference shares or non-profitable sales. This usually results in company A being drained of its assets and company B acquiring the assets with little to no cost. This, of course, is bad for other stakeholders of company A.

(3) Altruism – where the owner-managers endeavour to retain managerial ownership and control of the business by promoting members of their nuclear family to high-ranking managerial positions or even leadership of the company. Such appointments are often made based on family connections rather than professional qualifications, leading to poor management and inefficiencies in the company (Brenes et al., 2011; Gómez-Mejía et al., 2007; Memili et al., 2013). For example, the owner-manager of company A grooms their child for leadership even though there are better qualified (non-family) individuals for the job.

(4) Dividend manipulation – where dividend policy and payments are tailored to suit the requirements of the controlling party rather than the business. Excessive dividend pay-out can drain the cash reserves of the business, increasing the SME's operating risk.

(5) Unchallenged decision making – where due to the seniority and control of the owner-manager, employed managers and minority shareholders find it difficult to challenge owner-managers when they make poor business decisions that affect the SME adversely (Chua et al., 2003; Gomez, 2007; Schulze et al., 2002).

Conversely, founders will be less likely to question the actions or correct poor decisions made by family members who are working for the business (Schulze et al., 2002).

These incidences of nepotism, related party transactions and conflicts of interest can contribute to management inefficiencies that can reduce the value of the business(Schulze et al., 2001). Even if the SME is run by a sole proprietor they are not exempt from experiencing agency cost, because using Jensen and Meckling's (1976) definition of principal and agent, the sole proprietor is using his/her family's funds and putting it into the business. This means that the sole proprietor is only a part owner and is still answerable to his family members whose shared assets he has invested into the business.

Debt finance can form an external independent control that keeps family-owned businesses in check, preventing them from making decisions that can be bad for the company (Schulze et al., 2001). However, even in a situation where there is no dilution of ownership, the presence of debt has its own agency cost with the bank being the principal and the business owner the agent (Berger & Udell, 1998; Kolari et al., 1997; Meyer, 1998; Rachagan & Satkunasingam, 2009). The agency cost that arises from debt includes opportunity costs to the lending firm as a result of giving debt to the agent; the monitoring and bonding costs to ensure the agent fulfills their end of the bargain; and the related bankruptcy and liquidation costs should the agent fail to service their debt regularly (Jensen & Meckling, 1976).

Banks try to reduce risks associated with their investment by requiring credit guarantees from the business owner and the inclusion of both positive and negative loan covenants, which impact the freedom of management (Apilado & Millington,

1992; Berger & Udell, 1998; Craig, Jackson, & Thomson, 2007; Eisenhardt, 1989). These requirements may impact the joint owners of a business differently and thus give rise to a PP agency cost issue. A family home pledged as collateral for a business loan may be 50% owned by the spouse at law should the relationship dissolve. If the home is pledged as security and the spouse has no role in the business, then is this a PA agency cost. The spouse is entitled to 50% of the family income but may not be managing the business. Nevertheless, in an economic sense they are an owner.

The issue of agency cost is even greater when dealing with venture capital. Venture capitalist organisations (VCs) provide a useful illustration for external equity investment into an SME. If an SME is funded by a VC then the agency costs of monitoring and bonding are greater because the VC is not involved in the day-to-day operations of the business and often has to juggle a portfolio of several SME investments. Instead, the business owner seeks to run the business on behalf of the VC, but at the same time has virtual ownership of the company (Verwaal et al., 2010; Wright, Lockett, & Pruthi, 2002).

The agency cost is related to the management of risk surrounding the SME's operations. The success and the survival of the SME is important to its providers of finance as it represents their return on investment and their compensation for the agency cost that they bear. Risk is greatly affected by the agency cost that affects SMEs. This agency cost can arise from principal-agent or principal-principal situations. In SMEs with a greater concentration of ownership, PP agency cost tends to be more prevalent, whereas in SMEs where ownership is more distributed and managers are not owners, PA agency cost arises. SMEs are not immune to the effects of agency cost; rather, they experience different variations of it based on the

level of managerial ownership in the SME. This ever-present threat of agency cost creates a risky operating environment, outlining the need to measure SME risk.

2.8 The Relationship Between Ownership, Control and SME Risk

Jensen and Meckling (1976) describe how agency conflict and agency cost can arise in a business through the PA relationship. Shleifer and Vishny (1986) describe the effect that a concentration of ownership and control can have on the presence of agency conflict in the business. Subsequent authors researched how the shareholding and governance of a business affects the PA and PP relationship in business (Blanco-Mazagatos et al., 2007; Brenes et al., 2011; Leland, 1998; Young et al., 2008; Yu, 2012). The ownership and control within small family businesses are determined by the relationships between family members who hold shares in the business and their respective positions within the SME and the family (Hewa Wellalage & Locke, 2014; Rachagan & Satkunasingam, 2009). The level of concentration of ownership and control defines the type of agency conflict experienced by businesses: a low concentration of ownership and control leads to PA agency conflict; a high concentration of ownership and control leads to PP agency conflict (Ahmad & Mansor, 2009; Ali et al., 2010; Ang et al., 2000).

Agency conflict leads to PA agency cost in the form of misrepresentation, overinvestment and misappropriation of funds (Archer, Karim, & Al-Deehani, 1998; Yu, 2012) and PP agency cost through tunnelling, related party transactions and underinvestment (Banchit & Locke, 2011; Renders & Gaeremynck, 2012; Ward & Filatotchev, 2010). To identify agency conflict experienced by the business, authors have suggested different measurements ranging from the concentration of

shareholding in the business to the presence of professional managers in the business (Chua et al., 2003; Su, Xu, & Phan, 2008)

Risk arises from the presence of agency costs. SME owners need to be able to identify and measure the value of their business risk. Much effort has been expended on estimating SME risk, ranging from using multi-risk models to using cost of capital calculations (Britzelmaier et al., 2013; Palliam, 2005a). SME risk is often tied to SME survivability, which has resulted in some researchers using SME failure as a means to gauge the risk level of a SME (Abdullah et al., 2014; Cheung, 1999; Everett & Watson, 1998). However there remains a clear difference between risk and failure: risk is a condition of the business, whereas failure is the cessation of operations for a business.

This study proposes that through a series of connections, SME ownership and control will ultimately affect SME risk (Figure 1), highlighting the importance of other areas of SME operations such as agency conflict and cost. A connection is drawn between ownership and control of the SME risk.

Figure 1: The link between ownership and control and risk

This illustrates how the structure of the SME's ownership affects the conflicts that arise from its daily operations and thus its risk level.Figure 1 provides an improved understanding of the links between these elements. The hope is that this will encourage future debate and research on SME risk, specifically focusing on the underlying intricacies of ownership and risk.

2.9 Calculation of SME Risk and Return

All owners and investors require a return on the business into which they invest their resources. Calculating the return on investment is important for business owners as it allows business owners and investors a means to monitor their investments. Popular financial ratios such as the Return on Assets and the Return on Equity can capture the ratio of fina ncial return that investors can expect on their investments (Altman & Sabato, 2007; Edmister, 1972; Platt & Platt, 1991).

Risk is the variation in the return that business owners and investors can expect on their investments. If a business is said to have 'high risk' this means that the variation in its return is high. If a business is said to have 'low risk', this means that the variation in its return is low. Risk can be both positive and negative; however, from an investment perspective, investors usually are more concerned about the potential effects of negative risks, which entail a loss on their investments (Galagedera, 2007). Risk is relevant to SME owners as it can help to explain the potential returns that they can derive from investments they have made in their SMEs.Continuing from the discussion regarding agency theory and how it affects

SME risk in the previous chapter, this chapter will discuss the efforts made so far in estimating agency conflict in different situations. With an understanding of how agency conflict is estimated, the estimation of the risk associated with the operation of an SME can be further explored.

2.10 Estimating Agency Conflict

Agency conflict creates risks for SMEs. Agency conflict can be broadly categorised into Principal-agent conflict and principal-principal conflict. Because the two types of agency conflict arise from different sources, different measurements have been suggested by previous researchers in order to estimate them, as shown in Table 1.

Table 1: Measurements of PA agency cost

Author	Indicators used to measure PA conflict	Context	Findings
Jensen and Meckling (1976)	Utility Maximisation; Value of returns to business owner	A theoretical study on how agency cost can be measured and how it can arise	Argues that in cases of managerial ownership, agency cost does not happen.
Anderson et al. (2003)	Cost of debt; Level of debt held by the company	252 industrial firms in the Lehman Brothers' Index	Finds that family-owned businesses have a lower agency cost relating to debt as compared to non-family owned businesses
Memili et al. (2013)	Value of incentives given to non-family managers	2,019 small family firms	Incentives are used as a means to manage agency conflict and are a form of agency cost themselves. Interaction between family members and management can reduce the use of these incentives.

PA agency cost is characterised by the funds needed to ensure that management remains committed to the goal of maximising the wealth of the shareholders. In the earliest research on this, Jensen and Meckling (1976) suggest that utility maximisation, as a function of the amount of profit the agent's party can make, is a reliable measure of the amount of PA agency cost exposure. Managers operate the business on behalf of the principal; therefore the ability to maximise their own personal utility at the expense of the principal is often the most direct way of measuing PA agency cost. Anderson et al. (2003) view agency cost differently, with the finance provider being the principal and the business owner/operator the agent, operating the business on behalf of the finance provider. In their research, agency cost is represented by the cost of debt borne by the business, and the compensation that the finance provider demands in exchange for having to bear the agency cost of lending to the business. From a family-owned business perspective, when there is a large number of non-family members in the business, business owners may resort to paying managerial incentives to discourage business owners from maximising their personal utility at the expense of the shareholder (Memili et al., 2013). In their research, Memili et al. (2013) examine the use of managerial incentives as a means of estimating agency costs for a business.

Table 2: Measurements of PP agency cost

Author	**Indicators used to measure PP conflict**	**Context**	**Findings**
Su et al. (2008)	Concentration of ownership; presence of board of directors	1,377 State-owned corporations in China	The higher the degree of ownership concentration, the higher the PP agency cost for the company
Ward and Filatotchev (2010)	Management expenditure incurred; ownership	42 UK Life-Insurance companies	Insurance markets with independent agents and

	structure of the company; free cashflows		varied products have lower PP agency costs
Renders and Gaeremynck (2012a)	Ownership percentage of the largest shareholders; cashflow, voting and dividend rights	1,064 firm-year observations of SMEs in European countries	Firms with good corporate governance have lower PP agency costs and a higher firm value

With a greater concentration of managerial ownership, the threat of agency conflict shifts from PA to PP, which is why many of the measures espoused by researchers in the field revolve around the idea of managerial ownership and control. Su et al. (2008) use concentration of ownership as a measurement of PP agency cost. They argue that if ownership is concentrated in the hands of one individual then it stands to reason that individual wields a large amount of influence, which can cause them to maximise their profit at the expense of minority shareholders. This is why in their research, the presence of a board of directors is said to mitigate the effects of PP agency cost. Ward and Filatotchev (2010) look at PP agency cost from the point of view of insurance companies, as each insurance agent is said to operate with joint stock in the larger business; therefore agents competing with each other is classified as PP agency conflict. In this case, management expenditure is necessary to mediate the conflict between the agents, so an increase in management expenditure is seen as an increase in PP agency cost. Renders and Gaeremynck (2012) look at the impact that good corporate governance pracitices (separation of powers, board of directors, independent directors, etc) have on PP agency cost. Again, PP agency cost here is measured via concentration of ownership, as placing all the power into one individual or party's hands creates situations where that power can be used unfairly.

2.11 The Background of Risk and Return in SMEs

Risk is classically defined as the variation in the returns received on an investment (Dichev, 1998; Horowitz, Loughran, & Savin, 2000; Tobin, 1958). Return, on the other hand, is the financial gain that an investor receives on the investments they have made into their businesses (Bassett & Chen, 2001; Black, 1993; Roll & Ross, 1980). Generally speaking, the higher the risk associated with the business, the higher the return expected by the investor on the invesment made in the business.

The evaluation of business risk has been the subject of research from the 1950s onwards. Tobin (1958) analyses the liquidity preferences of listed businesses based on their risk levels, using the standard deviation of the businesses' stock price returns as a measure of risk. This measure was further refined by Sharpe (1964) in the initial development of the Capital Asset Pricing Model (CAPM) and the use of beta in capturing the risk faced by listed businesses. Sharpe observes how capital asset prices fluctuate and describes the theory to explain their movement, setting the stage for the creation of a logical framework to value the risk associated with returns on investment. Treynor (1965) proposes the use of returns charted over a period of time instead of average returns to measure the risk associated with investments in the markets, adding more value to the CAPM. The CAPM was further refined by the work of subsequent authors and became one of the most widely used methods for estimating the return of listed companies (Black, 1972; Lintner, 1965; Mossin, 1966).

As the CAPM grew in popularity, several researchers began to challenge its underlying assumptions such as the rationality of all investors and the existence of efficient markets. Black (1972) suggests the use of the Black CAPM, which is a

modified version of the CAPM that makes use of a zero-beta portfolio instead of basing the returns on the risk-free returns of the market. Fama and French (1996a) led the charge in the development of multifactor models for analysing company return, building upon the foundations of the CAPM and adding more dimensions to the calculation to account for factors such as investor behaviour and market position of stock prices. Other methods were also developed alongside the CAPM, including the arbitrage pricing theory model (Roll & Ross, 1980) and the probability approach (Cheung, 1999).

The use of financial ratios to evaluate businesses also has a long history. Edmister (1972) first proposes the use of financial ratios to evaluate the survivability of a business. Financial ratios are an alternative to determining business risk and return instead of using data from publicly-traded securities. Using financial ratios, business return can be represented by the earnings generated by the business (Almisher & Kish, 2000; Burger, 2012; St-Pierre & Bahri, 2006). This is especially useful for owners of SMEs who can't use market information to reliably estimate their business returns. Using ratios such as Return on Assets and Income Received for an SME allows business owners to monitor the levels of return from their investments.

Another perspective on returns also emerged for SMEs in the 1970s. For many SME owners, return can be interpreted as the ongoing survivability of the business, which is the main concern of the business owner (Gilmore et al., 2004). There has been a growth of research aiming to predict the failure (or survival) rate of SMEs using financial matrices, economical matrices, management matrices or a combination of all of these (Abdullah et al., 2014; Gaskill et al., 1993; Marom & Lussier, 2014). These researchers espouse the development of failure prediction models, using

information derived from various aspects of an SME's operations to predict SME failure using data from the years leading up to liquidation. Research shows that the nearer to the actual date of failure the prediction model is run, the more accurate the prediction rate is (Abdullah et al., 2014; Marom & Lussier, 2014). However, this line of research creates certain ethical conflicts because revealing such information to the public before actual failure may create a self-fulfilling prophecy that causes the entity to fail (Van Peursem & Chan, 2012).

It is difficult to value SME risk using market information because SMEs are usually not listed on the public stock exchange. In order to overcome this difficulty, Fuller & Kerr (1981) developed a method of using proxy entities that are listed on the market to value the risk of unlisted companies. The proxy method, also known as the pure-play method, is generally used to evaluate the risk for individual divisions within multi-divisional companies by using proxy risk values from listed companies that are similar in size and business activity to the entity under scrutiny (Collier & Grai, 2007; Parasuraman, 2002). This method will be explored in greater detail in subsequent sections.

While there are different research perspectives on valuing SME risk and return, the literature reveals a lack of empirical studies using a generalizable sample of SMEs. Returns to the equity investor should be commensurate with the size of risk the investor is taking on. However, because SME risk is difficult to value, most SME investors do not realise just how much risk they are exposed to from their SME. This results in poor judgment of the returns that investors require from their business. Evaluating the risk the owner is exposed to from investing in their SME is the first step to estimating the returns required from an SME.

2.12 The Evolution of Risk and Return Models

The previous section discussed the history surrounding the research on risk and return models. It also briefly mentioned the motivations behind the development of the various risk and return models used in the literature and how each model influences the development of subsequent models. This section will discuss some of the models used in the literature and emphasis will be given to their use in business settings.

2.12.1 The Capital Asset Pricing Model (CAPM)

The CAPM was first proposed by Sharpe (1964) as a means of pricing the risk associated with listed securities. CAPM differs from the measurements used in the next section in that it operates on the assumption that investors are risk-averse and have diversified their portfolios accordingly. As such it only takes into account the undiversifiable systematic risk inherent in the business, as represented by β. It has been further refined by other authors and is now a common fixture in many finance textbooks around the world (Lintner, 1965; Mossin, 1966; Treynor & Black, 1973). Because of its simplicity and ease of use, it is taught in many management schools and also enjoys widespread use among finance professionals in the industry (Britzelmaier et al., 2013; Cumming, Fleming, Johan, & Takeuchi, 2011; Fama & French, 1997; Perold, 2004). The CAPM is represented by the following equation (Fama & French, 2006; Lintner, 1965; Perold, 2004):

$$Cost\ of\ Equity = Rf + (Rm - Rf)\beta \qquad \textbf{(1)}$$

Where:

Rf = The risk free rate

β = The volatility or security risk of the business to the investor

Rm = The market risk rate

Prior to the development of the CAPM, securities were often valued at the cost of debt and it was generally assumed that businesses that did not have debt were businesses that were not worth investing in (Perold, 2004). Furthermore, risk in a business was usually represented as the standard deviation in the returns of a listed company over a period of time (Tobin, 1958). The development of the beta, which is a function of the security's movement over a period of time, usually measured in years, assisted in the valuation of a business's volatility and security risk (Ogden & Sundaram, 2006).

The CAPM can also be used in conjunction with the Treynor Ratio, which estimates the performance of the portfolio by comparing it with earnings that could have been earned in excess over an investment with no diversifiable risk (a risk-free investment) (Treynor, 1965b):

$$T = \frac{r_i - r_f}{\beta_i} \qquad (2)$$

Where:

T = Treynor ratio

r_i *= portfolio (i)'s return*

r_f *= risk-free rate*

β_i *= portfolio's beta*

The CAPM has come under close scrutiny and criticism because it is unable to account for anomalous market movements and various fluctuations in the market price of securities (Fama & French, 1996b, 1997, 2006; Frank & Shen, 2016). Chong, Jin, and Phillips (2013) also point out that using the standard beta in CAPM

takes into account the upward movements of stock as well as the downward movements and thus does not reflect the investors' risk-averse investment behaviour, where only downward movements (potential losses) are of concern.

2.12.2 The Jensen's Alpha and Sharpe Ratio

In considering returns on stock markets, these measures are still widely used by finance professionals to evaluate the performance of assets in different portfolios. The Jensen's alpha is used as a means of determining the asset's return, represented as the 'alpha' (α) (Jensen, 1968):

$$\alpha = R_i - \left[R_f + \beta_{iM}\left(R_m - R_f\right)\right] \qquad (3)$$

Where :

α = *Jensen's alpha*

R_i = *Return on the portfolio*

R_f = *Risk-free rate of return*

β_{iM} = *Beta of the portfolio*

R_m = *Return on the market*

Investors would seek out assets with 'positive' alphas, which are investments with actual returns higher than the expected returns (as defined by alpha). Functionally this is similar to the CAPM outlined previously; however, the Jensen's alpha looks at the return on individual assets against the performance of the portfolio as a whole. The Sharpe ratio also looks at the performance of an individual asset as benchmarked against another asset (Sharpe, 1966):

$$S_a = \frac{R_a - R_b}{\sigma_a} \qquad (4)$$

Where:

S_a = *The Sharpe ratio of the asset*

R_a = *The return on the asset*

R_b = *The return on the benchmark asset*

σ_a = *The standard deviation of the asset excess return* $(R_a - R_b)$

The Sharpe ratio looks at the performance of an individual asset relative to its performance as compared against a different asset. In terms of listed securities, performance is defined by the stock market returns generated by individual assets. The Jensen's alpha and the Sharpe ratio allow the investor to observe the return associated with a singular asset, separate from the rest of the portfolio.

2.12.3 Multi-factor Models

The multi-factor model was developed by Fama and French (1996) as a means of taking into account additional factors not explained by the CAPM. The multi-factor models include both the 3-factor model and the 4-factor model (Fama & French, 1996a, 1997, 2004) :

$$R_i - R_f = \beta(R_m - R_f) + s_i(SMB_t) + h_i(HML_t) \quad (5)$$

$$R_i - R_f = \beta(R_m - R_f) + s_i(SMB_t) + h_i(HML_t) + w_i(WML_t) \quad (6)$$

Where:

R_f = *risk-free rate of return*

β = *beta, or the degree of risk faced by the company*

R_m = *market rate of return*

R_i = *expected rate of return from the company's shares*

s_i, h_i, w_i = *weights for Small minus Big (SMB), High minus Low (HML) and Win minus Lose (WML) respectively*

The additional three factors added to the model are the market premium, the size premium and the book-to-market premium. The 3-factor model has also been expanded to include a fourth factor, market momentum, creating the 4-factor model, which is seen to be a more reliable estimate of a portfolio's cost of equity (L'Her, Masmoudi, & Suret, 2004). The multi-factor models, however, are not foolproof and Fama and French (1996) acknowledge the shortcomings of their 3-factor model in predicting return from short-term movements in stock prices. It is interesting to note that the multifactor models look at the size of the company in explaining their returns because it has been shown that size can affect the pricing of the risk associated with the required return on the company, with small stocks being more vulnerable to risk than bigger stocks (Fama & French, 1996a, 1997; L'Her et al., 2004). This implies that SMEs (even if they are not listed) inherently face a higher level of risk as compared to bigger businesses, necessitating a further exploration of this subject.

2.12.4 Black CAPM

One of the critiques of the CAPM is that certain low beta portfolios can sometimes outperform high beta portfolios, which runs counter to the theory that the higher the risk (beta) associated with an investment, the higher its returns (as calculated by CAPM) (Black, 1972, 1993). In order to work around these anomalies, Black (1972) suggested the development of the Black CAPM:

$$k_e = R_f + \beta\,(R_m - R_z) \qquad (7)$$

Where:

k_e = *cost of equity*

R_f = *risk-free rate of return*

β = *beta, or the degree of risk faced by the company*

R_m = *market rate of return*

R_z = *rate of return on the zero beta portfolio*

The Black CAPM makes use of a zero-beta portfolio that does not use the risk-free asset return in calculating the market premium $(R_m - R_z)$ in order to reflect investor attitudes towards portfolio investment. Investors may not necessarily calculate risk premium as the difference between the market rate and the risk-free rate but may instead use the difference between the risk-free rate and the return on a zero-beta portfolio. However, developing a hypothetical zero-beta portfolio for SMEs is difficult because many SMEs are unlisted and the relevant information may not be readily available.

2.12.5 Arbitrage Pricing Theory (APT)

The arbitrage pricing theory (APT) is an alternative way of valuing risk and return based on market information. It theorises that investors will want to take advantage of arbitrage positions in the market to maximise their personal wealth (Huberman & Wang, 2005; Roll & Ross, 1980). The APT is represented by the following formula:

$$\mathrm{R_i} - \mathrm{R_f} = \lambda_1 \mathrm{b_{i1}} + \cdots + \lambda_\mathrm{k} \mathrm{b_{ik}} \qquad \textbf{(8)}$$

Where:

R_f = *risk-free rate of return*

R_m = *market rate of return*

R_i = *expected rate of return from the company's shares*

λ_k = *factor that affects the risk premium*

b_{ik} = *weight assigned to each* λ_k

The return to the investor under the APT is represented by the difference between the expected return from the company's shares and the return on the risk-free investment, which is similar to the risk/market premium used in the CAPM (Roll & Ross, 1980; Sharpe, 1964). The risk premium is represented by a set of factors, λ, which are multiplied by a weight factor, b. In their research, Roll and Ross (1980) find that by using a maximum of five factors, they can reliably estimate the risk premium of a company. These five factors include external influences such as inflation, GDP and growth. In their study, Roll and Ross (1980) find that up to a maximum of five different factors are enough to explain the movement in asset returns. This frees the calculation from the often restrictive constraints of the market portfolio. It is interesting to note that in their study, Roll and Ross consider the CAPM to be an APT with a single factor, which is market return.

Applying the APT to SME risk and return measurement can be challenging as it involves selecting the relevant factors (which range from the company's industry to the current inflation rate) to use, finding data on the factors and subsequently assigning weights to those factors. Given the general difficulty in accessing SME related information, using the APT to value SME risk and return can be a very time-consuming exercise.

2.12.6 The Probability Approach

Instead of making use of market information to estimate business risk and return, some researchers have proposed using the probability of a business' survival in order to esimate their risk and return. The earliest researcher to propose a model using business survivability instead of the variance of returns to estimate business returns was Cheung (1999). The model proposed by Cheung is as follows:

$$k_e = \frac{R_f}{p} + \frac{1-p}{p} \qquad (9)$$

Where:

k_e = *cost of equity*

R_f = *risk-free rate of return*

p = *probability of business survival*

Cheung (1999) considers the risks associated with SME loan defaults and the costs associated with such defaults to providers of finance and business investors. By developing a probability model based on existing business survival rates, Cheung (1999) proposes a means of estimating a business's cost of capital in the start-up stage. The model proposed by Cheung uses the probability of survival of a business in a given industry within a certain geographic location. Cheung takes the average rate of survival for businesses and input it into the model in order to the derive the cost of equity, which relates to the return received by the owner/investor of the SME. Cheung mentions that this model is suitable for SMEs as it does not make use of any market information, which is usually unavailable for unlisted SMEs. However, determining the appropriate probability of survival to use in the equation is a challenge.

This model was then further refined by Moro and Nolte (2012) who added more factors to increase its accuracy:

$$k_e = R_f + \frac{p}{(1-p)} \times \frac{E + Dc - Ab}{T_{pw}} \qquad (10)$$

Where:

k_e = *cost of equity*

R_f = *risk-free rate of return*

p = probability of business survival

E = book value of business equity

Dc = book value of business debt collateralised against owner assets

Ab = residual return to debt holders in event of business liquidation

T_{pw} *= total personal wealth of the business owner*

Cheung's research has been expanded upon by Moro and Nolte (2012) who propose that the value of *p* be adjusted to take into account the performance of the business based on its EBITDA (Earnings Before Interest, Tax, Depreciation and Amortisation) and also the entrepreneur's past performances in previous business ventures. Their model takes into account the business owner's personal wealth, collateralised debt taken on behalf of the business (collateralised against the entrepreneur's personal assets) and the value of the firm's assets remaining to pay off the bank (in case of default/bankruptcy).

The method developed by Moro and Nolte is more suitable for single case studies of SMEs. Applying such a method to a generalizable study can be difficult due to the private nature of the information required to calculate the investor's risk exposure (such as the value of collateralised debt and the entrepreneur's total personal wealth).

2.13 Valuing SME Risk

Owners and investors alike are concerned with the risk that the SME will incur a loss as a result of poor financial or operational decision making. This risk of loss creates the motivation to develop methods to mitigate the risk via the use of hedging instruments, insurance policies and investment in internal controls (Allen & Santomero, 1998; Brown, Schaller, Westerfeld, & Heusler, 2013; Hammoudeh &

McAleer, 2013; Morard, Stancu, & Jeanette, 2013). There are costs associated with such activities and this can be termed the 'price' the SME has to pay to manage the risk. Risk is an abstract concept, which deals with the uncertainty that surrounds an entity. From a financial point of view, risk is the volatility of return. More importantly, it is usually associated with the probability of making a loss on investments made in a business or a project (Chong et al., 2013; Jensen, 2005; Lintner, 1965). This is known as the 'downside risk' as financial risk also includes the probability of making a profit on the investment (the upside risk) (Chong et al., 2013; Galagedera, 2007; Hammoudeh & McAleer, 2013). There is a risk inherent in every investment and investors will seek a return commensurate with the level of risk they are facing. The general rule is the higher the risk associated with the investment, the higher the required return (Harvey, 2004; Kirschenmann & Norden, 2012; Leland, 1998).

In considering the risk for SMEs, it should be noted that there are two different perspectives on what constitutes a risk for the SME. From the perspective of the investor, who is concerned solely with returns, the risk they face is the downside risk of making a loss on their investment, which can be mitigated by diversification and allows the use of the CAPM to price the required returns on their investment in the business.

From the perspective of the owner, the risk they face is much higher than the investor as financing used for the SME can be tied to their personal assets, and they are often in a position where they are unable to diversify the risk associated with their investment in the business. Beta remains a useful indicator of the performance of a business relative to the rest of the market but it should be noted that if viewed

from the perspective of a business owner, it is likely that the risk is undiversifiable and the use of beta in CAPM may not be applicable.

When estimating the risk exposure of any investment, the risk of concern to both the investor and the owner is the downside risk of the investment or business failing. Beta represents the volatility of return and this volatility can be both positive (upside) and negative (downside). By taking on a higher risk, investors demand a higher upside return to compensate for the risk of a possible high downside return (Jensen, 1968; Sharpe, 1964). To this end, the use of downside beta calculations in CAPM has been discussed in the literature, but like other studies relating to risk and return calculations, these discussions have predominantly focused on stock market returns of listed companies.

With regard to estimating risk for SMEs, some authors have suggested the use of the methods listed in Table 3:

Table 3: Indicators used to measure SME risk

Author(s)	**Indicators used to measure SME risk**	**Context**	**Findings**
Cheung (1999)	Probability of business failure	Demonstration of a theoretical method to calculate the cost of capital of Unlisted businesses in New Zealand	SMEs' cost of capital can be calculated based on the probability of business failure.
Everett & Watson (1998)	External factors such as unemployment, consumer purchasing index and the economy	5,196 (2,543 closures, 2653 continuing businesses) small retail businesses in Australia	There is a relationship between external factors and the likelihood of failure for the businesses in the location

Palliam (2005a)	Multi-risk model using business operations	Case study of a business in South Africa	The multi-risk model can comprehensively values an SME's risk based on the summation of the risk of all its key processes.
Wu & Olson (2009)	Balanced scorecard	A bank's list of business borrowers (country and sample size not disclosed by the author)	Balanced scorecards can offer appropriate measures for SME risk
Britzelmaier, Kraus, Ha, & Beck (2013)	Cost of capital	Case study of an unlisted German business	A WACC with modified inputs can calculate the cost of capital for an unlisted businesses.

The existing research shows the use of a range of models from the Balanced Scorecard approach to statistical models. The most recent research suggests that cost of capital, calculated using the PP beta, can be a means of evaluating SME risk (Britzelmaier et al., 2013). The PP beta used in this work was based on market benchmarks of listed companies; while this may be the best available estimate, it may not fully reflect the situation applying for small unlisted businesses. Britzelmaier et al. (2013) point out that the business used in their case study was a 'larger medium sized company'; however, since they did not note the number of employees, the asset size or the annual turnover of the company, the reader can only speculate on what that statement means. Furthermore, as Britzelmaier et al.'s research is based on a case study of a single German SME, it is difficult to generalise from their results.

A different path to ascertaining SME risk involves considering both internal (operations, finance, management,) and external (policies, competition, economy)

factors (Everett & Watson, 1998). Internal factors of a business's operation might be used to estimate SME risk but the complexity associated with such a measurement makes it difficult to implement in most SME settings (Palliam, 2005b). In order to calculate the total risk figure for a business, Palliam (2005a) suggests SME owners need to identify areas of risk in their business, outline the key processes that affect that area of risk, estimate the impact of the risk and then assign weights to each risk area. This method relies heavily on input from the business owner, which may affect the objectivity of the risk derived from and the weights assigned to each risk area.

External factors also affect the SME but are not reflective of the agency cost borne by the SME. They are appropriate to be used as macro level measurements of the general level of risk faced by SMEs within a given area (Everett & Watson, 1998; Wu & Olson, 2009). Even though Everett and Watson (1998) find a relationship between external factors and business failure, they do not take into consideration the relationships between the controlling members, their investors and other providers of finance and their effect on business risk.

SMEs are considered to be high risk investments for several reasons, including their opaque operating environment, unproven track record and high likelihood of business failure (Chandra & Silva, 2012; Chen, Miao, & Wang, 2010; Gilmore et al., 2004; Kirschenmann & Norden, 2012; Palliam, 2005a). As a result, providers of finance (such as banks and equity investors) place a premium on the value of the return required from SMEs (Apilado & Millington, 1992; Berger & Udell, 2002). This creates difficulties for SME owners, because they have limited financial resources with which to meet the demands of their finance providers.

The price of the risk associated with the required return on lending to an SME is often a combination of hard information analysed via a credit scoring system (Berger & Frame, 2007; Petersen & Rajan, 2002) and soft information gathered from developing a working relationship with the SME client (Berger & Udell, 2002; Hsia & Mendes-da-Silva, 2014; Petersen & Rajan, 2002). This is what banks use to determine whether to accept or reject a client, and the relevant rate of interest to be charged. The cost of capital is not widely used to value the risk associated with the required return on investing in SMEs because of a lack of relevant market information (Cole, Sampson, & Zia, 2011; Lippitt & Mastracchio, 1993).

The business founder is usually the main owner and equity investor in the SME although in some cases the largest equity holder can be an angel investor or a venture capitalist (Berger & Udell, 1998; Chandra & Silva, 2012; Panda, 2012; Wright et al., 2002). The business owner is often not concerned with the required return on his investment as his main concern is the operation and ongoing survival of the business (Gilmore et al., 2004). Angel investors and venture capitalists, on the other hand, value their return on investment based on the potential listing or divestment of their holdings for a significant profit in the distant future (Wall, 2007). Beta is not widely used by angel investors and venture capitalists to calculate the pricing of risk associated with the required returns on investing in an SME, and they rely instead on background checks and the strength of the networking relationship between the SME owner and the equity investors to mitigate the effects of agency costs and ensure a fair return on their investment (Davila & Foster, 2007; Pare, Redis, & Sahut, 2009; Wall, 2007; Yu, 2012). In the assessment of the pricing of risk associated with the required returns on the SME's debt and equity, the literature does not mention how these variables impact the SME's risk.

However, the use of qualitative methods of estimating SME risk can be time-consuming and costly. Adapting market-based return models for use with SMEs allows for greater generalisability in terms of research and access to greater empirical data analysis over a much wider sample. Furthermore, policy makers and institutional investors have access to a wider pool of data that can be used for decision making. In adapting market-based models for SMEs, the first step is to estimate the beta of the SME. For listed companies, beta is treated as the financial elasticity or the correlated relative volatility of the firm's asset returns to market returns and is usually represented as:

$$\beta = \frac{Covariace(r_a, r_b)}{Variance(r_b)} \qquad \textbf{(11)}$$

Where:

r_a = *The return on the stock price of the firm*

r_b = *The market return*

However, in calculating the beta for unlisted firms, deriving the stock price of the firm is impossible, as in the absence of publicly traded stocks, there is no way to estimate the return derived from the trading of unlisted stocks. In light of this, two methods stand out in the literature as reliable means of estimating the beta for SMEs. They are the pure-play beta method (Fuller & Kerr, 1981) and the accounting beta method (Hill & Stone, 1980).

2.13.1 The Accounting Beta

The accounting method first emerged as a way to benchmark the performance of the market beta against accounting information and was calculated as the accounting return of the firm being evaluated (Ball & Brown, 1969). Ball and Brown (1969) use three different definitions of accounting return which are

operating income, net income and the company's earnings per share. They find significant correlations between the accounting beta calculated for their sample and their corresponding market betas. Hill and Stone (1980) refine the research done by Ball and Brown, pointing out that using earnings per share as a measure meant that the accounting beta still needed to rely on market information. They suggest using purely accounting data to derive a non-market beta with the following formulas for accounting-based betas; the operating beta and the income beta (Ball & Brown, 1969; Hill & Stone, 1980):

$$\boldsymbol{Operating\ \beta} = \frac{\boldsymbol{COV\ (ROA_{i,}\ ROA_m)}}{\boldsymbol{VAR\ (ROA_m)}} \qquad (12)$$

$$\boldsymbol{Income\ \beta} = \frac{\boldsymbol{COV\ (IR_{i,}\ IR_m)}}{\boldsymbol{VAR\ (IR_m)}} \qquad (13)$$

Where:

$$ROA\ (Return\ on\ Assets) = \frac{Earnings\ before\ interest\ and\ tax}{Total\ Assets}$$

$$IR\ (Income\ Received) = \frac{Net\ Income + Non - recurring\ adjustments\ to\ net\ income}{Total\ Assets}$$

i = company/security

m = market

Beaver et al. (1970) frame the argument for using the accounting beta by suggesting the use of accounting-based measurements of risk as opposed to market-based measurements of risk. In their research on 307 listed companies on the NYSE, they outline the financial risks faced by a company as defined by the company's liquidity, dividend payout, asset size, leverage, and variability of earnings. They compare these risks against the market risk faced by the same company and find that there is

a relationship between the accounting risk and the market risk borne by the company. However the authors point out that it is possible that the accounting information of the company was translated by the investors into investing behaviours, which potentially affected the company's market price and by extension, the company's market risk.

Vos (1992) was one of the first researchers to look at the use of the accounting beta to estimate the risk faced by unlisted businesses. Using the accounting beta calculation proposed by Hill and Stone and Ball and Brown, Vos implements the approach using the following formula (Ball & Brown, 1969; Hill & Stone, 1980; Vos, 1992):

$$Accounting\ \beta = \frac{\Delta ROE_i}{\Delta ROE_m} \qquad \textbf{(14)}$$

Where:

$$ROE\ (Return\ on\ Equity) = \frac{Earnings\ before\ interest\ and\ tax}{Total\ Equity}$$

i = company/security

m = market

This allows the accounting beta to be calculated on a year on year basis using only two consecutive years as a starting point. Their research compares the use of the accounting beta in listed firms on the New Zealand stock exchange and its use in unlisted firms in New Zealand. They found that the accounting beta values for the unlisted firms were not significantly related to their accounting returns (calculated in lieu of market returns).

However, there was a significant relationship between the accounting and market betas for listed companies, lending support the to the findings of Beaver et al. (1970).

The results of Vos's research indicate that the accounting beta may not be an adequate measure of risk for small, unlisted companies. In research which also deals with unlisted companies, Almisher and Kish (2000) use the accounting beta in determining the level of risk associated with companies going for their initial public offering (IPO) in Canada. However these IPOs are different to the SMEs studied by Vos (1992) because they are more capitalised. Almisher and Kish (2000) nonetheless find that the accounting betas calculated for the IPO closely match the initial returns made by the IPO, post listing, and therefore have a strong predictive capability of the immediate performance of the IPO. St-Pierre and Bahri (2006) study the use of accounting beta in measuring the risk of unlisted Canadian SMEs and find that the accounting beta is not a suitable measure for these unlisted companies. They point out the need to develop an unlisted company risk calculation index that can shorten the decision-making time needed to carry out financial decisions for these companies.

Using accounting betas to determine the cost of capital for small and unlisted businesses may be inaccurate (St-Pierre & Bahri, 2006; Vos, 1992). The accounting betas however, seem to be a reliable estimate for listed companies and companies going for IPOs (Almisher & Kish, 2000; Beaver et al., 1970). The literature suggests that the accounting beta can be used to support the derivation of the market beta as opposed to being a standalone measure by itself.

2.13.2 The Pure-play Beta

The term 'pure-play' is used in portfolio management to describe a situation where only specific, targeted industries are used to build a portfolio, hence the portfolio risk only reflects the idiosyncratic risk faced by that target industry and is not influenced by risk from other industries (Geltner & Kluger, 1998). The pure-play

beta (hereonwards referred to as 'PP beta') therefore refers to a beta that can be assumed to be shared across firms of a similar size within a similar industry. Historically, the PP beta was developed as a means of estimating the cost of equity of individual divisions within multi-divisional companies (Fuller & Kerr, 1981; Parasuraman, 2002). As individual divisions are not listed on the stock market, the pure-play beta has been used as a means of calculating risk for these respective divisions. Fuller and Kerr (1981) propose that the beta of a multidivisional firm is the sum of the weighted average beta of each of its component divisions (Fuller & Kerr, 1981):

$$\beta_j = \sum_i W_{ij}\beta_{ij} \qquad \textbf{(15)}$$

Where:

β_j *= The beta of the multidivisional firm*

W_{ij} *= The weight assigned to each division 'i' calculated as the divisional sales divided by the total sales of the multidivisional firm*

β_{ij} *= The beta of each division*

In order to derive β_{ij}, listed companies of roughly the same size as the division and within the same industry are used as market proxies. An unlevered beta is first calculated from the proxy's capital structure in order to remove the 'capital structure' portion of the company's beta (Fuller & Kerr, 1981; R. Hamada, 1969):

$$\beta_{ij}^{u} = \widehat{\beta_{ij}}\left(\frac{\widehat{E_{ij}}}{\widehat{V_{ij}} - \widehat{T_{ij}} \cdot \widehat{D_{ij}}}\right) \qquad \textbf{(16)}$$

The unlevered beta is then 'relevered' with the capital structure of the multidivisional firm to calculate the adjusted beta for the respective division:

$$\beta_{ij}^{a} = \beta_{ij}^{u} \left(\frac{V_j - T_j \cdot D_j}{E_j} \right) \quad (17)$$

Where:

β_{ij}^{u} = *unlevered beta*

$\widehat{\beta_{ij}}$ = *beta of the proxy firm (proxy beta)*

$\widehat{E_{ij}}$ = *market value of the equity of the proxy firm*

E_j = *market value of the equity of the multidivision firm*

$\widehat{V_{ij}}$ = *market value of the total capital of the proxy firm*

V_j = *market value of the total capital of the multidivision firm*

$\widehat{T_{ij}}$ = *The tax rate of the proxy firm*

T_j = *The tax rate of the multidivision firm*

$\widehat{D_{ij}}$ = *market value of the debt of the proxy firm*

D_j = *market value of the debt of the multidivision firm*

β_{ij}^{a} = *the adjusted pure-play beta*

The pure-play beta was initially used by researchers in determining the relevant hurdle rate in making investment decisions to be used by different divisions within a multi-division corporation (Collier & Grai, 2007; Fuller & Kerr, 1981; Parasuraman, 2002). A multi-division company will typically have a single, company-wide hurdle rate (minimum rate of return), which it uses to evaluate investment decisions or capital projects. This hurdle rate is calculated based on the company's WACC, which is derived using a market-based beta. Using a single company-wide hurdle rate may hamper division-specific investment decisions because, for example, a division operating in a low-risk industry may have to turn

down potentially lucrative investments within their industry because the investment did not meet the company's hurdle rate (Fuller & Kerr, 1981).

However, calculating the relevant cost of capital for the division is difficult due to a lack of relevant market information. The PP beta remedies the situation by comparing the division to a market proxy, a listed entity in the same industry as the division and of a similar size. (Collier & Grai, 2007; Fuller & Kerr, 1981; Parasuraman, 2002). Fuller and Kerr (1981) support the use of the pure play method by comparing the average divisional beta of a multi-divisional company, calculated using the pure play method against its market beta. They find that the PP beta is not significantly different from the market beta. Parasuraman (2002) suggests that the unlevered beta of the listed proxy entity is first determined and then it is relevered with the capital structure of the multi-division company in order to determine the relevant divisional beta that can be used in the division's CAPM calculation.

Collier and Grai (2007) calculate the cost of capital for the IESS (Integrated Electronics Systems Segment) division of Motorola using the pure play method, comparing the IESS division to listed proxies that compete within the same industry of automotive electronic services. In their research, they find that the cost of capital for the IESS division is 9.3%, which is lower than the cost of capital used by Motorola (12.3%), supporting the use of a divisional hurdle rate instead of the company-wide hurdle rate in evaluating divisional capital investments.

Much like corporate divisions, SMEs also do not have relevant market information that they can use to calculate their betas. Therefore, in the case of SMEs, the pure play method of calculating the beta can be used in lieu of market information. However, as Britzelmaier et al. (2013) point out, it can be difficult to find a proxy

of a similar size that is listed and has the relevant market information needed to calculate a pure play beta. Other criticisms have also been leveled against the pure-play beta. In estimating divisional betas, the pure-play beta does not take into account the effects that a multi-division company has upon its constituent divisions and because of this, it does not reflect the synergies that multiple divisions have with one another. It also has a survivor bias when choosing proxy firms and it does not reflect the fact that proxy firms in general have less financial leverage than multi-division firms (Wood, Mcinish, & Lawrence, 1992). This results in biased estimates for the PP beta in estimating divisional beta (Zivney, 1989).

Using the PP beta in estimating the divisional beta for multi-division firms in the insurance and hospitality industry has also been proven inaccurate, although the authors put this down to industry-specific factors such as the presence of several sub-industries or an insufficient number of pure-play proxy firms (Cox & Griepentrog, 1988; Fields & Kwansa, 1993). Kaplan and Peterson (1998) suggest the use of full-information betas, which take into account other multi-divisional conglomerates in calculating pure-play proxies in the estimation of product line or divisional beta. They suggest that full-information betas are more accurate and are a better measure of the risk faced by firms. However the application of full-information betas to SMEs is unfeasible because they do not operate in the same environment as multi-divisional conglomerates.

2.13.3 Other Means of Pricing Risk for SMEs

Apart from the accounting beta and the pure play beta, other researchers have estimated the pricing of the risk associated with SMEs through other means. Palliam (2005) uses a multi-criteria risk model to determine the relevant cost of capital for the SME in his study. The multi-criteria model is made up of the different

operational aspects of the business and the SME manager has to input their feedback regarding the weighting of risks and the likelihood of risk and assign these values to each risk area. From the model, the cost of capital is calculated.

Howard and Jawahar (2002) discuss risk management measures for SMEs; taking into account their small size and resource constraints, they suggest various measures that SMEs can take to lower their risk profile, which include evaluating, reducing, transferring and avoiding their risks. Their study does not specifically discuss the measurement of the pricing of the risk associated with the returns on an SME but it does provide an insight into the nature of risk management within an SME.

Wu and Olson (2009) use an Enterprise Risk Management balanced scorecard analysis to determine the level of risk associated with SME loans made by a bank in Canada. Using the balanced scorecard, they were able to evaluate the credit risk associated with making loans to these SMEs, effectively measuring the risk associated with the financing of these SMEs. However the research does not address the issue of the SMEs cost of capital and instead positions itself more as a decision-making tool for banks.

Ogden and Sundaram (2006) derive their beta in their calculation of the cost of capital for SMEs by working backwards from an assumed cost of equity, which is similar to the business's Return on Assets financial ratio, and employing a trial and error system whereby the correct beta is found using the Excel program's autosolve function. While such a method makes logical sense, it lacks applicability and practicality in a real-life setting.

Where SME survivability is said to be the main concern of SME owners, predicting business survivability can be a useful measure of SME risk, although arguably, the risk being measured is more of an operational risk. In the previous section, probability models for estimating return to the investor were discussed, where the key input was the probability of the business's survival instead of beta (Cheung, 1999; Moro & Nolte, 2012). In the literature, some authors have discussed means of predicting business survivability using logit regressions and financial ratios (Altman & Sabato, 2007; Edmister, 1972). One of the most popular models to emerge from this school of thought is the Z-score model. In their paper, Altman and Sabato (2007) develop a model for predicting the survivability of SMEs using a sample of US companies. This model was later adapted by Abdullah et al. (2014) in their research on predicting the survivability of Malaysian SMEs. The output of Abdullah et al.'s model is a percentage of the survivability of the business, as given by the following formula:

$$Log\left(\frac{PD}{1-PD}\right) = a + b(total\ liabilites\ to\ total\ assets) - c\ (EBITDA\ to\ total\ assets) \quad \textbf{(18)}$$

And a second model, which includes firm age as a predictor:

$$Log\left(\frac{PD}{1-PD}\right) = a + b(total\ liabilites\ to\ total\ assets) - c(EBITDA\ to\ total\ assets) - d(Ln\ Firm\ Age) \quad \textbf{(19)}$$

Where: PD = Probability of default

It should be noted that Cheung (1999) does not specifically mention the best way to predict a business's survivability, instead offering an example of an industry-wide average survival rate. It is possible to input the probability results from Abdullah et al.'s model into Cheung's model.

2.14 Chapter Summary

This literature review provides a brief overview of the history of Malaysia with a more in-depth look at its economic activity. Malaysia is a relatively young nation, gaining its independence in 1957 and becoming established as a nation in 1963. However, it has experienced a great deal of economic growth, especially in the 1980s and the 1990s. This growth was hampered by the 1998 Asian financial crisis and Malaysia has been recovering since then. As a multicultural nation, Malaysia has many ethnicities living in the same country. Affirmative action policies put in place by the government ensure that the Bumiputra (indigenuous Malaysians) receive special benefits to education and business opportunities, which have helped develop a strong Bumiputra middle class. Most businesses in Malaysia are family-owned and are often politically connected or enjoy some form of political patronage. With Islam as the official state religion, Islamic finance has flourished in the nation, and many Islamic financial products are offered in the country by local and international banks. The Malaysian government gives a lot of support to local SMEs via organisations such as SME Corp and SME Bank. Start-up companies are also encouraged through government-backed venture capital outfits such as MAVCAP (Malaysian Venture Capital).

There are many risks inherent in the opeations of SMEs, many of which can be directly traced back to the ownership structure of the business. Agency cost affects SMEs with both highly concentrated and dispersed managerial ownership in the form of PP and PA agency conflict respectively. Combined with relative difficulty in accessing resources as compared to larger companies, SMEs operate in an environment that is affected by many variables and can be said to be risky, due to the number of unknown circumstances that affect it. This leads to a high churn rate

for many SMEs around the world. The presence of agency conflict in SMEs only increases the operating risks for SMEs and because of this, there is a need to measure SME risk.

By understanding the nature of SME risk, policies regarding their financial access, minority investor protection and risk awareness can be put in place to further enhance the development of SMEs. Valuing the risk associated with the investments made in SMEs will allow finance providers and investors to understand the level of risk exposure faced by the SME. This will help to create better access to debt and equity financing for SMEs, where currently poor pricing of risk drives some borrowers into the informal finance sector.

This chapter has also discussed the development of various return models and how risk is calculated to be used in those models. From the various models discussed in the literature, three different approaches of estimating SME risk are suggested. From the historical performance perspective, the accounting beta provides the risk associated with the return due to the owner of the SME. By using a market proxy, the pure-play beta estimates the SME risk based on the risks facing the sector in which it operates. The estimation of the probability of default departs from the estimation of beta but it provides a reflection of the combination of performance and sectoral effects on the SME.

These three methods can capture the risk faced by SMEs, which can arise from the agency conflict brought about by the structure, operation and governance of SMEs. Therefore, the first research question can be addressed, as to how SME risk can be measured. However, researchers have yet to examine and compare these different methods of calculating SME risk. Most importantly, there has been no attempt to

determine the relationship between risk, as defined by these measurements, with factors and characteristics of SMEs that are said to affect risk.

The next chapter contains a more in-depth discussion of the SME characteristics which can affect SME risk. The next chapter will outline the characteristics identified and the ways it can affect SME risk as suggested by prior research. The Chapter on SME characteristics and risk stands separate from the literature review because it mainly serves as a primer for the data and methodology chapter, where the characteristics identified will be used to form the hypotheses for the research.

3 SME Characteristics and Risk

3.1 Introduction

A business is defined by its characteristics, such as its industry, owner's background, size, capital structure and geographic location (Brenner et al., 2010; Glennon & Nigro, 2005; Lippitt & Mastracchio, 1993). Palliam (2005a) suggests the use of a risk evaluation matrix made up of characteristics of the firm's operations in order to value the risk associated with the business. Wu and Olson (2009) develop an SME scorecard analysis to evaluate and manage risk in SMEs, using operational characteristics of the firm to evaluate its risk exposure. Other researchers agree that the management of risk in SMEs typically makes use of firm characteristics in determining the risk exposure of the SME (Hollman et al., 1984; Howard & Jawahar, 2002). These firm characteristics represent the risk profile of the business and can potentially affect the SME's risk.

In wider research, various models have been used to determine the factors that affect SME growth and profitability. These models include the porter's five forces models, the balanced scorecard and other more qualitative measurements of SME risk (Ilhan & Zeynep, 2012; Narayanan & Fahey, 2005; Palliam, 2005a). These models highlight the different characteristics associated with SMEs and shows the impact that SME characteristics have on their operations. The use of these models to understand SME operations imply that characteristics can affect SME risk as well. While the Five Forces model and the balanced scorecard do not specifically estimate risk, the multi-criteria model suggested by Palliam (2005a) suggests that a host of business characteristics relating to production and operation can determine business risk. Building upon their reasoning, this research seeks to identify the

characteristics which can affect SME risk and determine their relationship with the risk calculated by the risk measures that this research has selected.

An SME's risk profile can also be affected by external risk factors such as corruption (Barth, Lin, Lin, & Song, 2009; Baxamusa & Jalal, 2014) and the nation's level of income (Harvey, 2004; Singh & Nejadmalayeri, 2004). However, due to data constraints, this research will focus on firm characteristics common to businesses in all countries, such as the ethnicity and gender of the business owner, geographical location of the business and firm size (Brenner et al., 2010; Bruno et al., 1987; Haughwout et al., 2009; Kyaw & Routray, 2006; Minns & Rizov, 2005; Verheul & Thurik, 2001; Watkins, 2007). In research relating to firm characteristics such as firm size, loan maturity, capital structure, internal finance and the ethnicity of the business owner, the authors do not address the connection between these characteristics and the cost of capital of the SME, although they look at the impact each characteristic has on other financial aspects such as loan default probability, growth opportunities and access to finance (Berger & Udell, 2002; Carpenter & Petersen, 2002; Cavalluzzo et al., 2002; Glennon & Nigro, 2005; Haughwout et al., 2009; M. Singh & Nejadmalayeri, 2004).

An SME's firm characteristics represent its risk profile. In the following sections, this study will discuss the different characteristics that make up a business's risk profile and how researchers have analysed their relationship with other aspects of business finance. The characteristics identified in this chapter all have the potential to create risky situations for SMEs, either by affecting their financial risk (through debt, gearing and liquidity) or their business risk (through operations, ownership structure and environment). SME risk is the combination of both business and financial risks.

Figure 2 shows the characteristics, drawn from the literature, which will be discussed in this research:

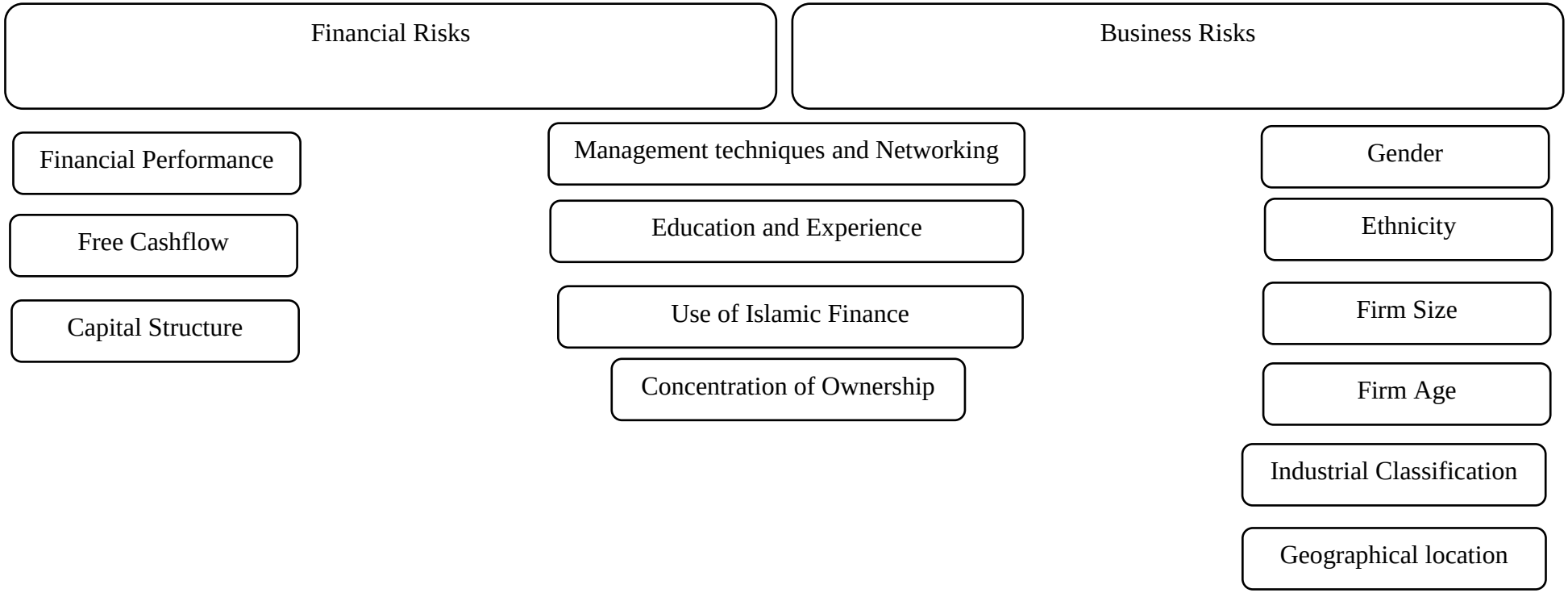


Figure 2: Categorisation of SME characteristics

3.2 Financial Performance

A business exists to serve its stakeholders' interests, namely its owners, investors, customers, creditors, employees and various governing agencies. A business's financial performance is an important indicator of how well it is delivering on the investments made by its investors and financiers. The ability of a business to remain a going concern is closely tied to its financial performance, which in turn impacts its ability to serve its stakeholders' interests. In the literature, various ratios are used to represent the performance of companies, both listed and unlisted. These ratios include the EBIT (Earnings before interest and tax) ratio, sales/asset ratio, the efficiency ratios, liquidity ratios and gearing ratios (Abdullah et al., 2014; Almisher & Kish, 2000; Beaver et al., 1970).

Financial performance is also closely tied to firm survivability. In their research on predicting the failure rate of Malaysian SMEs, Abdullah et al. (2014) find that businesses with low liquidity and EBIT ratios have a higher likelihood of failure as compared to businesses with higher ratios. In the literature on the development of accounting betas to measure the risk volatility associated with companies, accounting measures such as return on assets, return on equity, gearing and profitability are used as means of estimating the betas required (Almisher & Kish, 2000; Beaver et al., 1970; St-Pierre & Bahri, 2006; Vos, 1992).

Financial performance can affect the pricing of the risk associated with the returns required on investments made in an SME. This is because financial performance reflects the ability of the SME to generate the return required by investors. This research will use financial performance as one of the SME characteristics that make

up its risk profile. Table 4 shows the financial ratios used in the literature to estimate the risk associated with operating an unlisted business or SME:

Table 4: Use of financial ratios to analyse unlisted businesses

Financial Ratios	**Abdullah et al. (2014)**	**Almisher and Kish (2000)**	**Vos (1992)**
Total Liabilities to Total Assets	X		
Short-term liabilities to total Assets	X		
Current Assets to Current Liabilities	X		
Sales to total Assets	X		
Return on Assets	X	X	X
Return on Equity	X		X

The literature has shown that financial performance can affect an SME's survivability and the investing risk associated with investing in the business. There is a possible relationship between the financial performance of SMEs and the pricing of the risk associated with the required return on SME debt and equity.

3.3 Free Cash Flow

The free cash flow (FCF) is defined as the cash flow in excess of funds required to fund all positive net present value capital projects (Jensen, 1986). Free cash flow is typically calculated as the total of net operating cash flow and net investing cash flow and is represented by the following equation:

$$FCF = \{(EBIT\ (1 - tax\ rate) + Depreciation\ and\ Amortisation \quad (20)$$
$$-/+change\ in\ Net\ Working\ Capital)\}$$
$$-/+\{(net\ Capital\ Expenditure)\}$$

Where:

The first parentheses = value of operating cash flow

The second parentheses = value of investing cash flow

FCF directly affects the level of cash a business has and in the case of SMEs, it is considered to be a key risk area, which can potentially affect business survivability (Gilmore et al., 2004). FCF only includes the amount of cash generated by operating activities less the amount spent in acquiring and disposing fixed assets (investing activities). It does not include the cash generated or spent in financing activities. Carpenter and Petersen (2002) use free cash flow as a variable to determine the level of internal financing used by the businesses in their study on the effect of internal financing on the business's growth prospects. Leland (1998) suggests that free cash flow can affect the debt structure of the business. Cash flows from financing activities are not relevant to the calculation as they would be affected by the cost of debt and cost of equity.

FCF is mostly referenced in relation to Jensen's (1986) free cash flow theory, which states that the agent will invest the company's funds into projects with negative NPV if they have excess free cash flow after investing in projects with positive NPV, instead of sharing excess funds with the principal, so as to maximise their return at the expense of the principal (Jensen, 1986; Lang, Stulz, & Walkling, 1991). FCF represents the funds generated by a business in operating and investing activities and is a good measure of a business's survivability. If the agent in the

SME is abusing the FCF at the expense of the principal, then that will impact the risk associated with the required return on investing in the SME as it will result in a higher agency cost. The literature suggests a link between a business's FCF and its risk exposure. However, there is still a gap in determining the effects of an SME's free cash flow on its cost of capital.

3.4 Capital Structure

Capital structure refers to the mix of finance that businesses use to fund their business activities. It is the blend of debt and equity finance that is used by the business. Capital structure reflects the type of financing used in running the business and it can affect the business's risk because debt and equity are key components of measures such as the pure-play and accounting beta (Ball & Brown, 1969; Fuller & Kerr, 1981). Furthermore, previous research has shown that elements of debt and equity can affect business risk and survivability (Kwansa & Cho, 1995; Singh & Nejadmalayeri, 2004; Vos & Webber, 2000; Yousfi, 2012).

Debt is considered to be 'risky', as defaulting on loans can lead to the winding up of the business (Berger & Udell, 1998; Scherr, Sugrue, & Ward, 1993). The level of debt commitment in an SME is also associated with the level of commitment a business owner has towards the business. As debt allows the owner to retain a larger proportion of ownership, the owner is more motivated to ensure the long-term survivability of the business (Wu, 2010). Castanias (1983), in his research on business failures, finds that businesses with a lower level of leverage tend to have a higher risk of bankruptcy as compared to businesses with a higher level of leverage, due to the presence of a tax shield in higher leveraged businesses which helps to reduce their long-term risk exposure.

Carpenter and Petersen (2002), in their research on manufacturing companies registered with the American Securities Exchange Commission, find that businesses with larger amounts of external equity investments experience greater growth prospects, which in turn affects their long-term survivability as compared to businesses that rely heavily on internally generated equity finance. Leland (1998) shows that equity holders in a company will choose strategies that will maximise the value of their claims as opposed to other claimholders (debt holders), thus affecting the valuation of risk relevant to the company. Glennon and Nigro (2005) include elements of equity as one of the explanatory variables used to predict the likelihood that an SME will default on its loan guarantee.

The balance of debt against equity may affect the attitudes adopted by equity investors in SMEs, as they may affect the pricing of risk associated with the required returns on investment. Capital structure may affect the long-term viability of SMEs, affecting the pricing of the risk associated with the required returns associated with their business. However, the literature has not yet determined how this mixture of debt and equity can impact an SME's beta.

3.5 Management Techniques and Networking

The actions taken by management to manage, measure and control operational risk will impact the overall risk borne by the company (Howard & Jawahar, 2002; Wu & Olson, 2009). St-Pierre and Bahri (2006) include qualitative measures of management control and behaviour as control variables in their research examining the use of accounting beta as a reliable measure of firm risk.

Lundvall and Battese (2000) examine how firm size affects management's attitude towards research and development and the adoption of technological solutions.

Everett and Watson (1998) suggest that apart from lack of access to capital, lack of management skills on the part of the business owner also contributes to firm failure, thereby increasing firm risk.

Relationship building and networking are also important determinants of not only business survivability but also the likelihood the business will gain access to financing. Relationships built up between the business owner and the loan officers at banks often help the business owner to obtain loans at a more favourable rate (Berger & Udell, 2002; Dabbas, 2012). The use of support networks and business contacts has also been examined as a means of stimulating business growth and survivability (Brenner et al., 2010; Hsia & Mendes-da-Silva, 2014; Oikawa & Tanner, 1992; Yang, 2011).

3.6 Education and Experience

Business owners come from different educational backgrounds and bring different experiences with them to the formation of their business. The effect that education and experience has on business owners has been well documented, with researchers finding that a higher level of education and a higher number of years working has a positive effect on business success and survivability (Bates, 1990; Moro & Nolte, 2012; Robinson & Sexton, 1994).

The positive effect that education has on entrepreneurial success and survivability has motivated colleges and universities to invest in the development of academic courses designed to produce new entrepreneurs (Ariff & Abubakar, 2002; Lane, Hunt, & Farris, 2011; Zainal Abidin & Bakar, 2005).

Experience is also an important factor that can lessen the risk of business failure. In their research on self-employed individuals in the USA (some of whom were SME

owners) Robinson and Sexton (1994) find that the mean number of working experience for successful (as measured by annual income) business owners before starting their business was between 10 and 14 years. Experience is often treated in the literature as a form of informal education, lending support to the idea that education is crucial to business survival and success (Corbett, 2005; Knotts, 2011; Kolb & Kolb, 2005; Robinson & Sexton, 1994).

In summary, there is a possible link between the education and experience level of the SME owner and the pricing of the risk associated with the required returns on investments made into SMEs. This is because the education and experience of the business owner can affect the survivability and success of the business.

3.7 Islamic Finance

Malaysia is a Muslim-majority nation and shows robust use of Islamic finance in its economy (Abdullah & Muhammad, 2008; Che Ibrahim, 2009). Malaysian businesses operate in an economy where they can select from both Islamic and non-Islamic products.

Islamic financing is different from regular interest-based financing because it rejects the notion of valuing the cost of debt using interest, which it deems as usury. Islamic finance has its roots in the beginning of Islamic teachings in a pre-Islamic Arab world, where borrowers had to deal with exorbitant interest rates that often served to double their principal amount, forcing the borrower into indentured slavery to the lender (Hearn et al., 2012; Shubber & Alzafiri, 2008). Therefore any reference to interest in financial products is deemed ‘haram’ or impure, according to Islamic Jurisprudence, known in the Muslim world as ‘Shariah’ (Mirakhor, 1996). Islamic finance revolves around providing finance to the borrower without charging

an interest rate and creating return on the lender's investment. One of the most common forms is the sale and buy-back agreement (Bai'al'inah), where the borrower sells an asset to the lender at a lower price in exchange for funds now and will then enter into a contractual agreement to buy the asset back in the form of instalments at a higher total price (Hearn et al., 2012; Jobst, 2005). Other forms include Murabahah, where the buyer obtains the goods now and agrees to pay the seller for the goods at a higher fixed price in the future (Jobst, 2005). Essentially Islamic financing is a form of structured finance, which seeks to reduce the amount of ambiguity and volatility present in modern financial instruments such as credit derivatives and margin financing (Jobst, 2005). Structured finance is defined by Jobst (2005) as finance which has clear, fixed rates, a fixed maturity and low volatility.

Islamic finance has been shown to have an impact on the cost of capital of the parties that use and distribute it (Hearn et al., 2012; Jobst, 2005; Mirakhor, 1996; Shubber & Alzafiri, 2008). Hearn et al. (2012) analyse companies on the Khartoum Stock Exchange, Sudan, which operates in an Islamic-based economy. In an Islamic-based economy, the burden of disclosure is higher than that in a conventional market and this often leads to higher monitoring costs. Hearn et al. (2012) argue that this higher monitoring cost leads to a higher cost of capital and that firms able to cross-list on different conventional markets (apart from the Islamic Khartoum Stock Exchange) enjoy a lower cost of capital due to lower costs of monitoring in these other markets. However Jobst (2005), in a review of the literature regarding structured finance, points out that in light of the growing ambiguity and volatility of the credit derivatives market, structured finance that

provides clear returns can reduce the information asymmetry and, by extension, the cost of capital for businesses that use structured finance.

Islamic finance creates a situation where debt is virtually non-existent in the balance sheets of Islamic financial institutions. Shubber and Alzafiri (2008) find that deposits with Islamic banks are not recorded as liabilities and that payments made to depositors are not recognised under operating expenses; instead they are treated as profit-sharing payments made to investors. In calculating the cost of capital for Islamic banks, Shubber and Alzafiri (2008) do not calculate the cost of debt, as some of the bank managers they interviewed said that debt was irrelevant. However, this accounting treatment may change in the future as Malaysia seeks to adopt the IFRS, which requires sale and buy-back arrangements to be recorded and their implicit interest rates (Chenhall & Smith, 2011). Recognising that Islamic financial structures do not allow for debt, Mirakhor (1996) proposed using Tobin's Q in calculating the cost of capital in an interest-free economy.

A business may be able to reduce its cost of debt or eliminate it entirely if Islamic finance is the sole choice of finance. This will affect the business's cost of capital, as having a lower debt risk exposure will affect the pricing of the risk associated with the required returns on the SME's finance.

3.8 Concentration of Ownership

While not strictly a financial variable, concentration of ownership can be measured through the largest percentage of shareholding held by the largest shareholder (Hooi et al., 2015; Zhang, 1998).

Concentration of ownership has been extensively explained in chapter 2 and the consensus, based on the literature, is that higher levels of concentration of

ownership can lead to higher incidences of principal-principal agency cost, while lower levels of concentration can lead to higher incidences of principal-agent agency cost (Banchit & Locke, 2011; Hewa Wellalage & Locke, 2014; Jensen & Meckling, 1976). Agency cost is detrimental to a business and its presence can affect SME risk. Using the largest share percentage alone, however, is an inadequate measure of the concentration of ownership as, typically, information regarding the staffing of the managerial positions in the business (whether they are family/non-family) can also help to determine the level of managerial influence concentrated in the hands of the owner (Ali et al., 2010; Ghobadian & O'Regan, 2006; Peng & Jiang, 2010).

3.9 Gender

In developing countries, a large proportion of SME owners are female; they run their own cottage industries to supplement their families' incomes (Jothilakshmi, Krishnaraj, & Sudeepkumar, 2009; Kyaw & Routray, 2006; Ondoro & Omena, 2012). There have been efforts from governments and aid institutions towards improving women's access to finance and educating them in management skills and financial literacy (Carpena, Cole, Shapiro, & Zia, 2011; Jothilakshmi et al., 2009; Watkins, 2007). Female entrepreneurs in developed countries also receive similar attention in terms of growth and development opportunities, with some groups forming mentoring support networks for female entrepreneurs (Ncube & Wasburn, 2010).

The presence of female SME owners is well researched. However, since 2001, there have been few studies that discuss the connection between gender and the cost of capital. Verheul and Thurik (2001), in their analysis of 2000 Dutch business owners

(1500 male, 500 female), find little evidence of discrimination purely based on gender when it came to obtaining loans and the pricing of those loans. However, in their study, the gender variable seems to be negatively related with equity finance. Cavaluzzo and Cavalluzzo (1998) share a similar view in their study of SMEs in the USA, where white female entrepreneurs are only slightly disadvantaged as compared to white male entrepreneurs when it comes to debt finance costs and approval. Verheul and Thurik (2001) also consider the 'female profile', in which, based on previous research, female entrepreneurs are generally more involved in the service industry, are part-time entrepreneurs and do not participate in many networking activities. According to them, these characteristics, rather than discrimination on the basis of gender, contribute to the lower likelihood of female entrepreneurs getting loans from the bank. Singh and Zammit (1999), however, in their review of the literature related to gender and capital flows, point out that in developing countries, women are subject to institutional and cultural bias to the extent that in some South Asian countries, women require the signature of their spouse or a male relative to obtain a loan. It is likely that women in developing countries are brought up in a society that favours more masculine values, which works against them when it comes to accessing capital (Dunn & Shore, 2009; Hofstede, 2002).

Gender also seems to determine the kind of industries that entrepreneurs choose to get involved in. Verheul and Thurik (2001) find that male entrepreneurs preferred capital-intensive retailing and manufacturing work while female entrepreneurs were more service-oriented, sticking to businesses with low barriers to entry. Along the same lines, Mohd Noor and Dola (2010) find that women are less likely to join the agricultural and livestock industry as compared to men. This difference in

choice of industry may be defined by cultural and gender bias and it may affect women's access to and associated costs of capital, as banks tend to be less favourably inclined towards lending to service-oriented industries (Verheul & Thurik, 2001). However, when it comes to microfinance initiatives, the majority of recipients are women (Jothilakshmi et al., 2009; Miller, Dawans, & Alter, 2009; Ondoro & Omena, 2012; Shiralashetti, 2011).

Gender and gender-based discrimination relates to the access to and pricing of finance. While females may not experience discrimination based on their gender alone, the cultural and social norms associated with their gender cause them to be at a disadvantage in terms of networking, choice of industry and level of commitment, and this in turn affects their business's risk (Verheul & Thurik, 2001). Therefore, the type of capital they can gain access to will affect the pricing of the risk associated with the required returns on investments made in female-owned SMEs, with male-owned SMEs having an advantage.

3.10 Ethnicity

Cavalluzzo et al. (2002) find evidence that SME owners from ethnic minorities were being unfairly discriminated against by banks in terms of disbursement of loans. In their research using a dataset of the National Survey of SME Finance, USA (NSSBF), Cavalluzzo et al. (2002) find that in areas where bank competition is low, there is a tendency for bank officers to discriminate against ethnic minorities. However, they find in more densely populated urban centres, where there is a higher concentration of banks, discrimination is not as apparent. Using the same dataset, Bates and Robb (2013) point out that over the past ten years little has changed and that minorities still suffer from the same discrimination they did ten years ago. Bates

and Robb (2013) find that SME owners from ethnic minorities, such as African-Americans, with similar financial backgrounds to Caucasians, generally pay higher interest rates. In Malaysia, there are government-linked financial institutions such as MARA that, as a rule, only provide loans to members of the majority ethnic Bumiputra group. These ethnic-based loans can potentially affect the risk of the recipients of these loans (Abdullah & Muhammad, 2008; Fong, 1990; Gomez, 2012). Other researchers have looked at how ethnicity affects the operational decisions and market penetration ability of SMEs, but not specifically at how it impacts their financing or risk (Brenner et al., 2010; Rasheed, 2004).

Discrimination based on ethnicity creates a situation where ethnicity can affect access to capital. Access to capital will affect the ability of a business to operate and survive, further increasing its risk profile and the pricing of risk associated with the required returns of investing in that SME.

3.11 Firm Size

In research on SMEs, firm size is often used as a variable to describe the level of risk associated with a business's growth and survivability (Abdullah et al., 2014; Bernardt & Muller, 2000; Pagano & Schivardi, 2003; Vos, 1992). There are different definitions used to define firm size in the literature. The most popular way of measuring firm size is via the number of full-time employees working in the business, because the number of employees is easy to verify and is an indicator of long-term business survivability (Beck & Demirguc-Kunt, 2008; Beck et al., 2005; Glennon & Nigro, 2005; Kirschenmann & Norden, 2012; Pagano & Schivardi, 2003). The number of assets is also used by some researchers as an indicator of firm size because they are more tangible estimates of the value of the company's size

(Abdullah et al., 2014; Hymer & Pashigian, 1962; Thornhill & Amit, 2003). There is less support in the literature for the use of sales value as a measure of firm size because the sales figure is seen to be an unreliable measure of firm size due to its relative ambiguity (Beck & Demirguc-Kunt, 2008). In Malaysia, the firm size for SMEs is determined by the lower figure of either the company's number of employees or their annual sales turnover (SME Corporation Malaysia, 2013b).

For the purposes of this research firm size is measured by the total annual sales revenue of the business. Measures of size using assets and number of employees were not undertaken in this research because asset values are already reflected in the return on assets under the financial performance characteristics and information on the number of employees was unavailable in the dataset used.

Firm size is an important indicator of firm risk. Glennon and Nigro (2005) show that firm size can affect the likelihood of an SME defaulting on its loan guarantees, with an increasing rate of default of 2.6% for every five employees. Kirschenmann and Norden (2012) show that firm size is a factor in determining the volume and maturity (duration) of loans given to businesses by banks and financial institutions. Firm size has also been linked to the growth prospects of a company, with several researchers finding a negative relationship between firm size and the level of growth experienced over time (Beck & Demirguc-Kunt, 2008; Bernardt & Muller, 2000; Hymer & Pashigian, 1962; Yasuda, 2005).

Firm size affects the duration and cost of finance a business has access to. This influence of firm size on the risk associated with investments in companies is also documented in the asset pricing literature and forms an important factor used in the multifactor models used to estimate the pricing of portfolio risk (Fama & French,

1996a; L'Her et al., 2004). There is an indication that firm size can affect an SME's beta; however, the connection between beta and firm size is not apparent.

3.12 Firm Age

Firm age is defined as the number of years a business has been in existence. Many researchers have examined the relationship between firm age, firm size and firm growth, with many finding that growth prospects tend to slow down as a firm ages (Bernardt & Muller, 2000; Evans, 1987a, 1987b; Lundvall & Battese, 2000). Firm age is also related to business failures, with researchers indicating that younger businesses are more susceptible to business failure than older businesses (Abdullah et al., 2014; Thornhill & Amit, 2003).

Thornhill and Amit (2003), in their research on bankrupt Canadian companies, examine the reasons for the failure of young (less than 7 years' trading) and old (more than 7 years' trading) businesses. They find that younger businesses fail due to poor access to capital and older businesses fail because they are unable to adapt to changes in the industry. Younger firms tend to have greater difficulty in accessing capital due to their unproven track record and lack of transparency in their financial statements (Neely & Van Auken, 2012; Thornhill & Amit, 2003).

In Malaysia, there is a 50% rate of failure for businesses, with 60% of these businesses failing within the first five years of operation (Ahmad & Seet, 2009; Mohd Aris, 2007). In their development of a predictive model for SME failure in Malaysia, Abdullah et al. (2014) find that including firm age as a predictive variable in the model enhances the accuracy and predictive strength of the model, as opposed to using only financial performance variables alone. The failure of the firm will affect the level of risk associated with the business and the literature has shown that

there is a relationship between firm age and firm failure. There is an indication that firm age can affect the pricing of the risk associated with the required return on the SME.

3.13 Industrial Classification

Each business operates within its industry. SME Corporation Malaysia, (2013b) provides 20 different industrial categories of SMEs ranging from agricultural-based to mining. In the literature, the industrial classification is usually included in the descriptive statistics for the businesses being studied (Cumming et al., 2011; Degryse & Van Cayseele, 2000; Fama & French, 1996b; Fong, 1990; Jahan-Parvar, Liu, & Rothman, 2013; Pardo, 2013). Glennon and Nigro (2005) use the industrial classification of the borrowing business as an explanatory variable in explaining the likelihood the borrowing business will default on its SME Association (USA) loan guarantee. Brenner et al. (2010), in their study of ethnic entrepreneurs in Canada, observe how ethnicity can affect, among other things, the type of industry their respondents choose to start a business in. Verheul and Thurik (2001) mention that banks tend to view services-oriented businesses less favourably, indicating some barriers to capital for entrepreneurs coming from the service industry. The literature has not explored the possibility of using industrial classification as an explanatory variable in determining its effects on the cost of capital.

In their research on market risk and beta, Kaplan and Peterson (1998) point out the averaging effect that multi-divisional firms which span across different industries have upon their divisional betas. There is also evidence that different industries face different levels of risk, have different betas and as a result have different values of

cost of capital or hurdle rates that are relevant to their investment decisions (Cox & Griepentrog, 1988; Fields & Kwansa, 1993)

The SME Corporation Malaysia (2013b) provides a different set of cut-off points in terms of annual sales turnover and number of employees for each broad industrial category (manufacturing or services/others). This affects the type of financing available for businesses operating in different industries. The presence of specialist banks like the agricultural bank (Agro Bank) and the infrastructure development bank (BPMB) in Malaysia will also affect the type of financing different industries will have access to (Ariff & Abubakar, 2002). This difference in terms of financing can affect the pricing of the risk associated with the required returns on an SME's finance.

3.14 Geographic Location

Geographic location can affect the profitability of a business due to factors such as the proximity of finance providers, suppliers and customers (Dunn & Shore, 2009; Sikligar, 2008). Hanson (2005) looks at the impact that geographical location has upon economic growth and job opportunities. Using a dataset from the Bureau of Economic Analysis, he calculates the average earnings, wages and consumer growth based on certain geographic locations around the USA. He finds that geographical locations with higher consumer growth typically have higher wages and salaries. This indicates that the geographical location can influence the economic activity of businesses within the area. However, a link between the risk borne by these industries and their geographical location was not established.

El Ghoul, Guedhami, Ni, Pittman and Saadi (2013) test the relationship between the cost of equity and geographical location. Through their research, based in the

USA, they find that enterprises closer to financial centres enjoy lower costs of capital of up to 7 basis points (0.07%). At a global level, Harvey (2004) uses the International Country Risk Guide (ICRG) database to measure the risk levels faced by a list of countries around the world, implying a certain level of cost of capital to be related to the country's level of risk. The research mainly tests the robustness of the ICRG but it lends some support to the assumption that different locations will experience different levels of cost of capital.

Special Economic Zones (SEZ) have been set up in several countries, including India, China, Malaysia and Ghana, in order to stimulate economic growth in those geographical areas (Aggrawal, 2006; Farole, 2010; Ge, 1999; Saleh & Ndubisi, 2006). SEZs are geographic areas within which businesses can take advantage of certain privileges such as reduced or eliminated import duty, lower tax rates, government subsidies and cheaper finance rates (Aggrawal, 2006; Ge, 1999). Ge (1999) notes the economic growth experienced by Shenzhen, the first Special Economic Zone set up in China, and it ability to attract foreign investment and develop local businesses at the same time. However this success story is not shared in other parts of the world such as India and parts of Africa, where SEZs are often managed under political pressure and there is a lack of co-ordination in SEZ development (Aggrawal, 2006; Farole, 2010). Malaysia maintains a number of SEZs, notably the Port Klang Free Trade Zone (PKFZ), Kulim Industrial Park, and the recent Iskandar Development Region (Ariff & Abubakar, 2002; Fong, 1990; Saleh & Ndubisi, 2006; Zulkifli-Muhammad et al., 2009). The location of SMEs within these SEZs has the potential to affect the pricing of risk associated with the investments made in them because being in an SEZ gives them certain benefits and

reduced finance costs, implying that geographical location can affect an SME's cost of capital.

Singh and Nejadmalayeri (2004) analyse the impact that overseas investments have on French companies' cost of capital. They find that the cost of debt for the companies in their study went down because overseas diversification reduced the company's risk profile. However, these companies were subject to higher risk assessments in their overseas market due to information asymmetry, increasing their cost of equity. The net effect was still a reduced cost of capital overall.

Depending on their geographic location, businesses experience different levels of economic growth and thus gain differing levels of access to finance. This difference in terms of location translates to a difference in terms of opportunities to grow and to obtain better financing. This can affect the risk associated with the required returns from investing in SMEs as the survivability of the business can be affected by its location. The literature supports the existence of a link between the geographic location of a firm and its cost of capital. However, researchers have not analysed how an SME's beta is affected by its geographical location

3.15 Chapter Summary

The risk associated with investing in an SME is relevant to the various characteristics that affect the operation of a business. In determining the factors that can affect SMEs' risks, this research analyses the relationship between the risk applying to an SME and its firm characteristics. These characteristics include financial performance, capital structure, ethnicity, firm size, geographical location, and industrial classification. This research analyses these characteristics because of their prevalence in the literature and the availability of data relating to these

characteristics. There are other characteristics that may influence the cost of capital, such as the presence of information asymmetry (El Ghoul et al., 2013; Yousfi, 2012), relationship banking (Berger & Udell, 2002; Degryse & Van Cayseele, 2000) and the personal wealth of the SME owner (Avery & Bostic, 1998; Moro & Nolte, 2012). However, due to the absence of reliable secondary data on which the study can base such variables, these characteristics are not analysed in this research.

By determining the relationship between firm characteristics and an SME's beta, business owners and providers of finance can benefit from an increased understanding of how the characteristics of the business affect their risk as investors in the business. This will contribute to a better pricing of risk associated with the required returns on the SME's equity.

4 Data and Methodology

4.1 Introduction

The previous chapter discussed various characteristics that can potentially affect SME risk as noted in the literature. These characteristics serve as the basis for developing the hypotheses in this research.This chapter discusses the dataset used in this study and the methods used to analyse this data. Justifications for the use of the dataset and methods arel also provided.

In selecting the observations to use, the SME definition is first considered. As mentioned in earlier chapters, this research uses the SME definitions supplied by the Malaysian government. Classification of a business's size is based on the industry the business operates in (manufacturing or non-manufacturing) and the value of its annual sales. In many cases, a business can change size classes over its years of operation so each observation was assigned its own 'size code', which reflected the business size at that particular observation date. In the event a particular company exceeded the upper sales threshold for what constitutes an 'SME' for a given year of observation, that observation was removed from the dataset. This was to ensure that the sample contained observations from SMEs only.

Based on the table given, it should be noted that 'Micro' businesses are subsumed within the general 'SME' categorisation, according to the official Malaysian classifications.

Table 5: SME definitions used in Malaysia

Size/Sector	Manufacturing Sector	Services/Other Sectors
Micro	Sales turnover less than RM 300,000 OR Full-time employees fewer than 5	Sales turnover less than RM 300,000 OR Full-time employees fewer than 5
Small	Sales turnover between RM 300,000 and RM 15 million OR Full-time employees between 5 and 75	Sales turnover between RM 300,000 and RM 3 million OR Full-time employees between 5 and 30
Medium	Sales turnover between RM 15 million and RM 50 million OR Full-time employees between 75 and 200	Sales turnover between RM 3 million and RM 20 million OR Full-time employees between 30 and 75

4.2 Tests of normality

This section covers the tests of normality performed to determine whether the dependent variables measured in this research are of normal distribution or not. The tests used on each dependent variable are the histogram, the QQ plot, skewness, kurtosis and the Jarque-Bera test. The results for each test are provided for each variable and a brief discussion of the test results are provided as well.

Figure 3: Histogram for pure-play beta

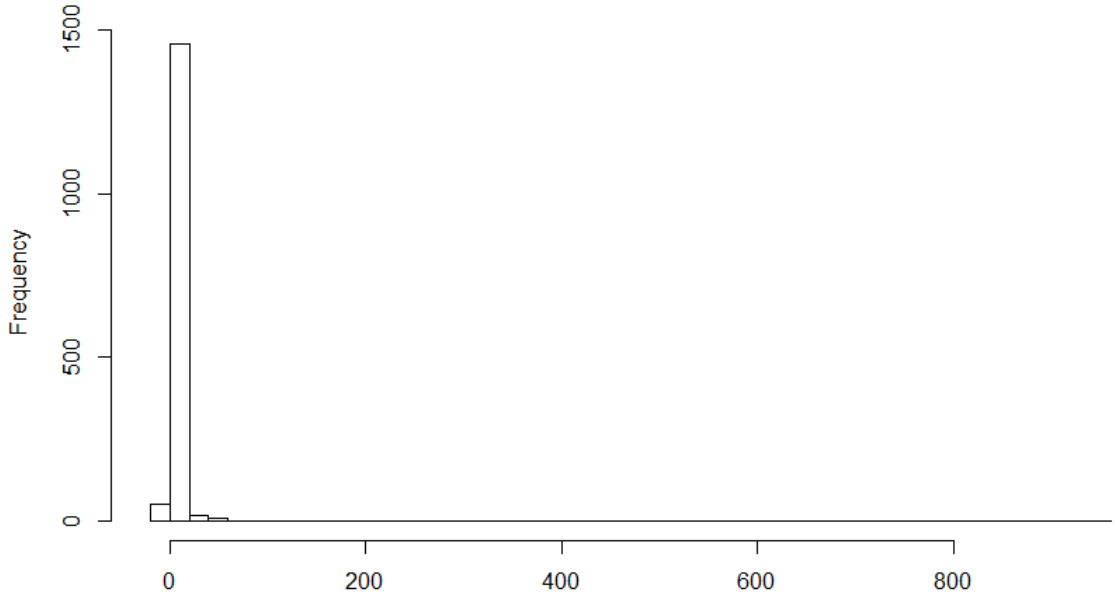
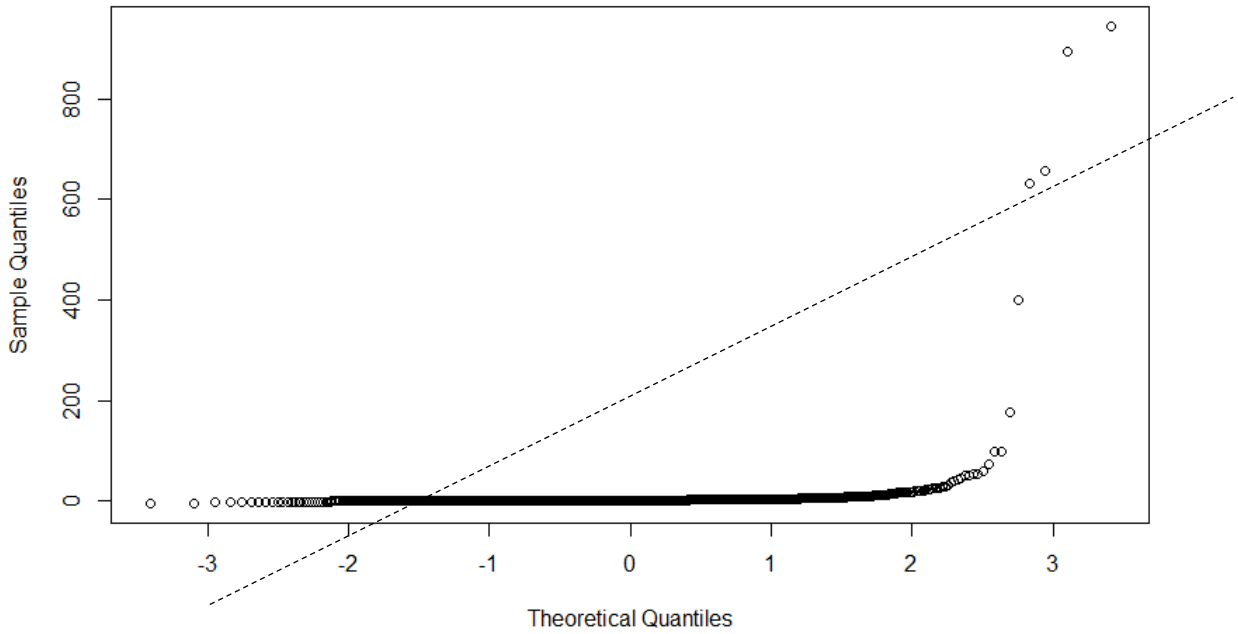


Figure 4: QQ plot for pure-play beta:



1. Skewness: 18.33449
2. Kurtosis: 360.7455
3. Jarque-Bera test: JB = 8303800, p-value < 2.2e-16

For the pure-play beta, the histogram seems to have a normal distribution, with most of the data being distributed towards the centre and sparse distribution around both tail ends. However a look at the QQ plot will indicate that it is not normally distributed. According the skewness value of -4.317495, it seems to be highly negatively skewed. The Kurtosis value of 98.18973 also indicates a

high concentration of data points around the mean, indicating a non-normal distribution of data. The Jarque-Bera test gives it a p-value of less than 2.2e-16, meaning that the distribution of the pure-play beta in this dataset is non-normal as well. Therefore, this research will treat the pure play beta as a non-normally distributed variable.

4.2.1 Accounting Beta

Figure 5: Histogram for accounting beta

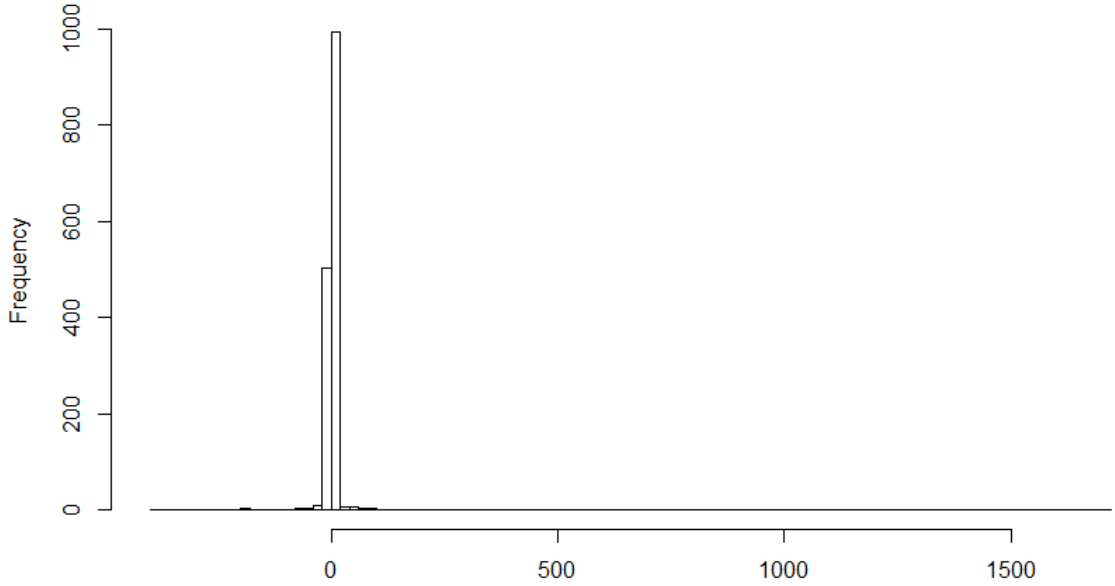
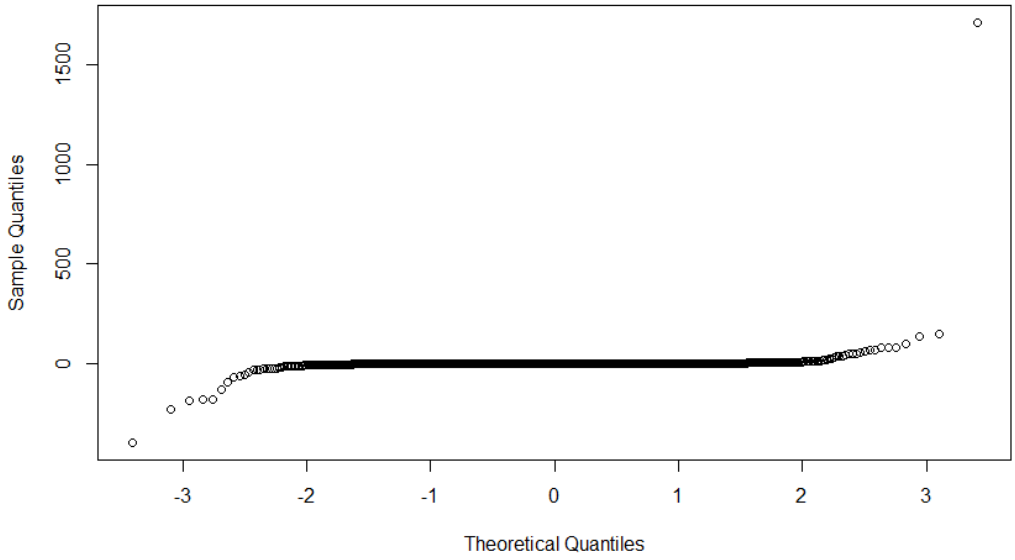


Figure 6: QQ plot for accounting beta



1. Skewness: 30.83108
2. Kurtosis: 1147.882
3. JB = 84405000, p-value < 2.2e-16

The histogram shown above indicates that the distribution of data is heavy towards the right-tail end, visually indicating a non-normal distribution. This is supported by the graph plotted on the QQ-Normality plot, which indicates a non-linear relationship between the variable and normal theoretical quantiles. A skewness of -11.07401 indicates that it is heavily negatively skewed and a kurtosis value of 140.4181 indicates that there are a high number of observations centred around a certain range of values. With a p-value of less than 2.2e-16, the Jarque-Bera test indicates that the Operating Beta variable has a non-normal distribution. With this in mind, this research shall treat the Operating Beta as a non-normally distributed variable.

4.2.2 Probability of Survival 1 (PS1) (Abdullah Model):

Figure 7: Histogram for probability of survival model 1

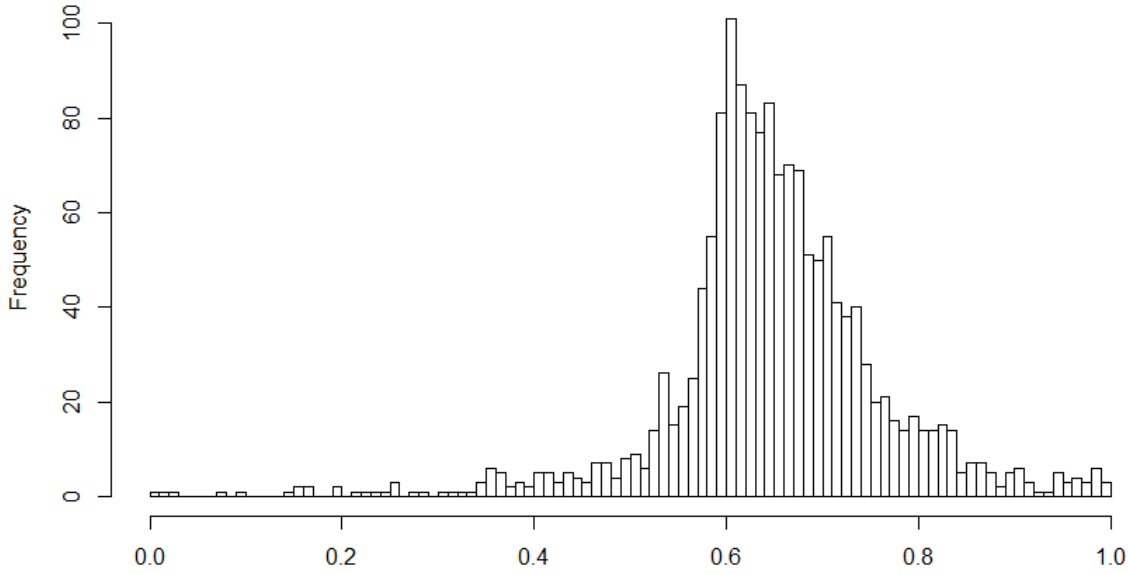
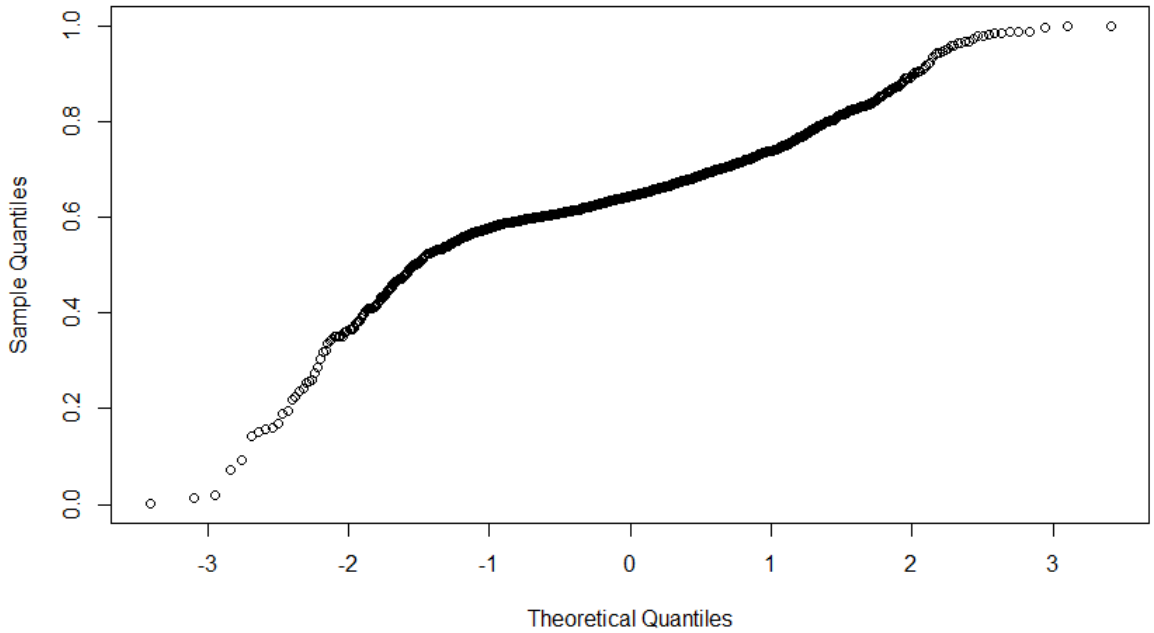


Figure 8: QQ plot for probability of survival model 1



1. Skewness: -0.7618643
2. Kurtosis: 7.527118
3. JB = 1465, p-value < 2.2e-16

The histogram shows the distribution of the values for the probability of the business survival under the PS1 model. A normally distributed histogram will be heavily distributed towards the centre and sparsely distributed on both tail ends. However, the histogram shown here has its distribution heavily skewed to

the right, indicating a non-normal distribution. The QQ plot, which is also used to visually distinguish a normal distribution should ideally form a linear plot as shown by the dotted line. However the QQ line shown here is not linear, further indicating that the PS1 results are not normally distributed. The skewness of -2.772384 confirms that the distribution is heavily right-skewed. A kurtosis of 12.0037 indicates that the data peaks high towards the mean and has heavy tails. The Jarque-Bera test has a p-value of less than 2.2e-16, meaning that there is a very strong possibility that the PS1 values in this dataset is not normally distributed. Therefore, this research shall treat the PS1 variable as a non-normally distributed variable.

4.2.3 Probability of Survival 2 (PS2) (Abdullah Model):

Figure 9: Histogram for probability of survival model 2

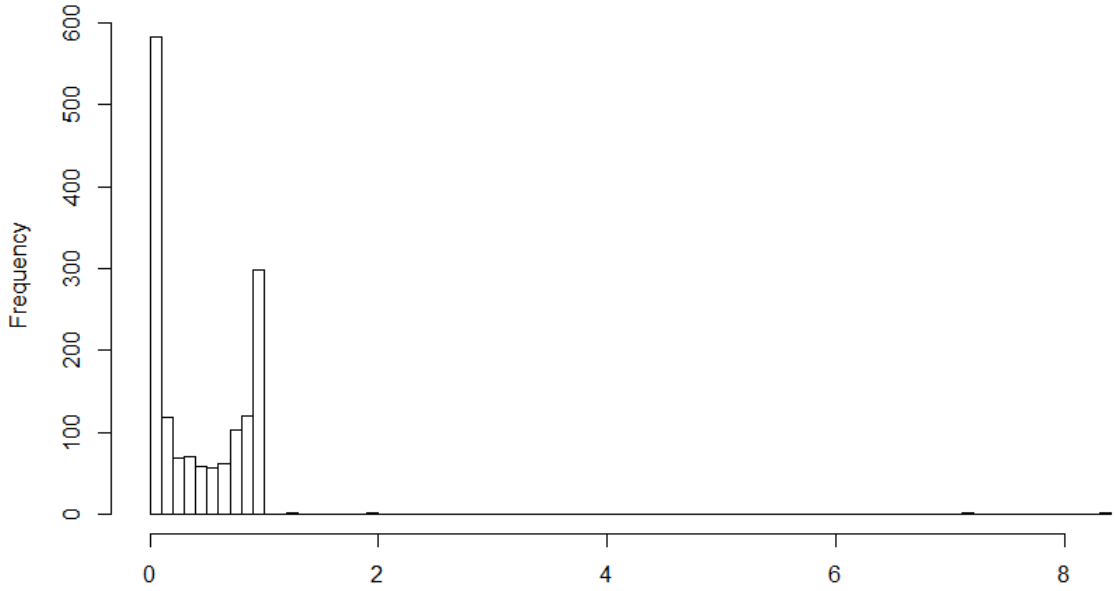
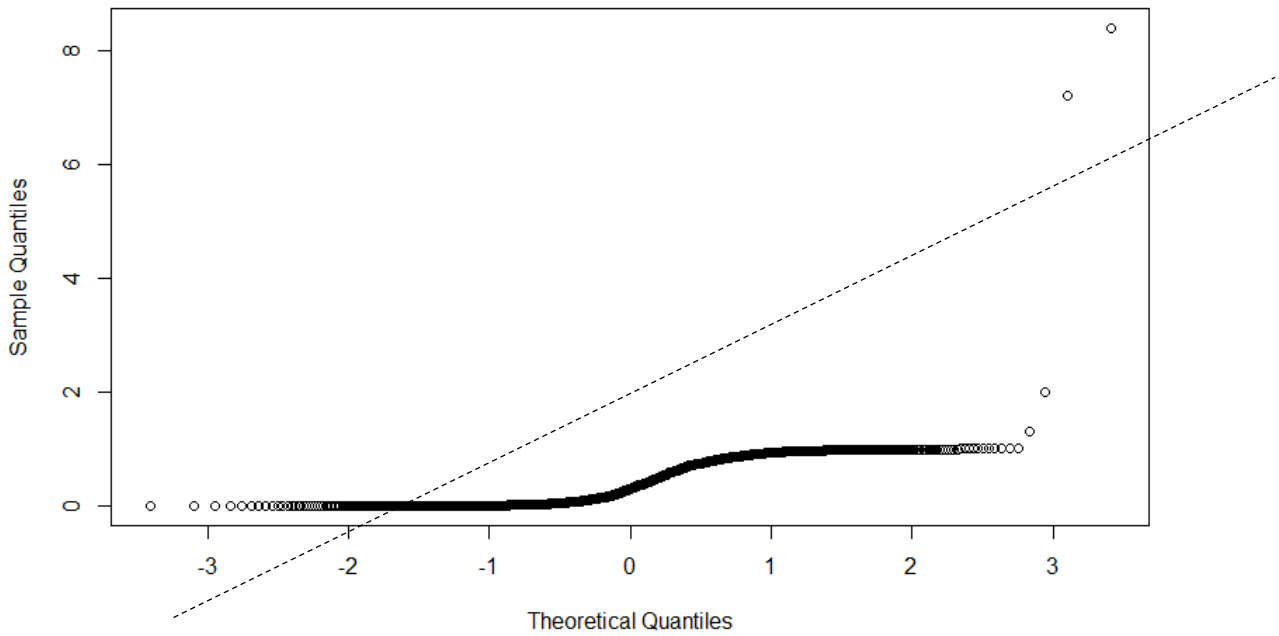


Figure 10: QQ plot for probability of survival model 2



1. Skewness: 5.1982
2. Kurtosis: 81.1825
3. JB = 399410, p-value < 2.2e-16

The histogram for the PS2 shows that it has heavy tails and is very sparsely distributed towards the centre, indicating a non-normal distribution. The QQ plot is also not linear, further indicating the non-normality of its distribution. The skewness value of 0.3235833 is not too high and does not indicate a heavy positive nor negative skew, however this is due to the fact that the distribution of data are heavily weighted on both tails of the data as seen in the histogram. The kurtosis is not too high either at 1.446706, however this could be due to the fact that the heavy tails on each end may be working to balance out the kurtosis reading. According to the Jarque -bera test, the p-value is less than <2.2e-16, indicating that the distribution of the data for PS2 is not normal. Therefore this research shall treat the PS2 variable as a non-normally distributed variable.

4.3 Description of Data

The data were obtained from the database of the Malaysian Companies Commission, known by their Bahasa Malaysia acronym as 'SSM' *(Suruhanjaya Syarikat Malaysia).* The database consists of the annual company reports, which all registered businesses in Malaysia have to file, regardless of their ownership structure and size. As a result, relevant financial and non-financial information even from smaller businesses is available through this database. However, the database is not publicly available and in order to access it, payment is made based on the number of company observations required. An SSM officer will then transfer the desired database content to the researcher.

For the purposes of this research, a request was made for company data, specifically asking for observations with the following characteristics:

1. Sales of less than RM50,000,000 a year (to ensure that the business falls under the SME definition as set by the Malaysian Government)
2. Has the following information available:
    a. Capital Structure
    b. Profitability
    c. Shareholder's Equity
    d. Average age of owners
    e. Ethnicity of business owners
    f. Gender of business owners
    g. Location of the business premises
    h. Age of the business/firm
    i. Sub-industry to which the business belongs

From the criteria mentioned above, an unbalanced raw panel dataset was obtained, containing 400 companies and observations covering the years 2005 to 2015. The dataset used starts from 2005 as that was the earliest point at which data could be provided for the dataset. This raw dataset was then subject to the data cleaning and editing procedures covered in the next section.

In arriving at the final sample size, several data cleaning and editing procedures had to be undertaken. These steps included:

4.3.1 Removal of 'Dormant' Companies

Some companies in the dataset were marked as 'dormant': this implies that the business is no longer in operation and thus observations containing the word 'dormant' were removed.

4.3.2 Classification of Industries

Companies were sorted into their respective industrial categories, which initially consisted of Manufacturing, Services, Primary Agriculture, Construction and Mining. Observations in the category of Construction and Mining were eventually eliminated from the sample due to the effects of the other data-cleaning steps.

4.3.3 Removal of Technically Insolvent Companies

While the companies in the dataset were formally still in operation, several companies were found to have had negative equity for consecutive years of operation (brought about by consecutive losses). Years where companies had negative equity were removed from the sample, despite such businesses formally still being going concerns. This research treated them as technically insolvent, because keeping them in the sample would skew the results of the regression model and create unnecessary bias in the results.

4.3.4 Listwise Deletion of Missing Observations

Where there were no values for a given variable in an observation, that observation was removed. This applied to observations that had missing values in fields such as 'Total Sales', and 'Total Assets', because having a null figure in any of these fields does not make logical sense. In addition, observations which appeared to be obviously incorrect, such as where the profit after tax figure was higher than the total sales figure, or there were negative total sales figures, were also removed. It is likely that such errors were caused by human error during data input.

4.3.5 Removal of Repeated Time Variables

In the dataset, some observations had similar company IDs and years of reporting, because the company in question had published two financial reports in that time period. This can be attributed to a change in financial reporting periods or a need to fulfill certain legal reporting requirements. To prepare the dataset for panel data analysis, these repeated time variables had to be removed. In most instances, the period ending 31 Dec of the observed year was selected as the observed variable and the other observation was deleted.

4.3.6 Outlier Values

There were a few observations with values that lay far outside the average distribution. This study retained these outlier observations for the following reasons:

1. They were not a result of human error, and as such, reflected the true value of the field.
2. The outlier values, while extreme, did not provide sufficient evidence of insolvency and upon examination, observations with outlying extreme

values were still technically sound with regard to other financial ratios (Debt-Equity, Current Ratio)

3. The outlier values were calculated because of the high use of debt/equity in the companies from which these observations were obtained. Eliminating the extreme values caused by high debt/equity companies could distort the distribution of data with regard to these SMEs.
4. It is common for SMEs to rely heavily on a single source of finance. Eliminating observations which reflect this fact seems shortsighted and may mispresent reality.
5. The data was winsorized and a regression was run on the winsorized dataset. However, it was found that the winsorized regression models were all over-identified and could not be relied upon for reliable results.

As a result, no treatment was undertaken to remove or reduce the occurrence of outlier values.

4.4 Description of sample size

After cleaning, editing and removing observations that were not relevant to the research, a final sample consisting of 303 companies and 1541 observations was derived. Please note that in table 6, the figures shown are based on the values in the dataset thus the columns in the table do not add up.

Table 6: Financial summary statistics

Financial Information	Mean (RM)	Std. Dev.	Min (RM)	Max (RM)	Skewness	Kurtosis
Fixed Assets	1,711,281	8,309,097	-	247,000,000	19	510
Current Assets	2,315,574	9,057,368	2,326	248,000,000	20	474

Total Assets	4,835,201	18,900,000	36,558	549,000,000	19	482
Paid Up Capital	725,785	4,676,279	-	137,000,000	23	604
Share Premium	1,098,508	12,600,000	-814,606	310,000,000	18	373
Retained Earnings	899,592	3,602,003	-27,300,000	39,100,000	6	54
Minority Interest	30,942	928,146	-63,457	36,000,000	38	1,461
Share Capital	4,226	75,691	-	2,210,497	23	602
Total Equity	2,759,053	16,600,000	29	483,000,000	20	511
Long Term Liability	442,941	2,059,830	-638,879	54,200,000	15	333
Current Liability	1,633,295	3,743,238	2,500	55,200,000	7	72
Total Debt	2,076,236	4,911,080	2,500	78,900,000	8	85
Other Income	301,978	1,259,328	-	12,700,000	6	41
Revenue	3,410,761	4,337,514	-	40,400,000	3	18
Total Income	3,712,739	4,282,365	4,200	40,400,000	3	18
Profit Before Tax	167,299	1,747,780	-17,900,000	59,500,000	25	874
Profit After Tax	123,486	1,721,744	-17,800,000	59,200,000	25	912

Table 7: Other summary statistics

Category	**Frequency**	**Percentage**
Sub-Industry		
Manufacturing	149	9.67

Services	1,377	89.36
Primary Agriculture/Other	15	0.97
Business Ethnicity		
Malay	80	5.19
Chinese	946	61.39
Indian	17	1.1
Mixed Ethnicity	498	32.32
Size Category		
Micro	15	0.97
Small	1,006	65.28
Medium	520	33.74
Location		
Major Urban	739	47.96
Minor Urban	434	28.16
Rural	368	23.88
Business Gender		
Male	162	10.51
Female	25	1.62
Mixed Gender	1,354	87.87

Table 8: Owner and firm age

Owner/Firm age	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Owner Age	1541	45.27098	7.278535	26	68	.1536639	2.612984
Firm Age	1541	12.48799	9.304064	0	45	.9926624	3.381786

Table 9: Risk measures

Risk Measures	Obs	Mean	Std. Dev	Min	Max	Skewness	Kurtosis
Pure-Play Beta	1541	5.22	42.19	(4.81)	944.54	18.33448	360.7454
Accounting Beta	1541	0.82	47.03	(397.10)	1,713.85	30.8349	1148.064

Probability of Survival (Model 1)	1541	0.65	0.12	0.00	1.00	-.7618649	7.527118
Probability of Survival (Model 2)	1541	0.41	0.39	0.00	1.00	.3067922	1.404667

4.5 Method

In order to answer the first two research questions, this research compared three of the methods used to measure SME risk in the literature, which are the pure-play beta, the accounting beta and the probability of survival method. In the case of the probability of survival method, the model used is the modified Z-score model employed by Abdullah et.al (2014): in their research, two models were used and this research used both models in its analysis.

A correlation analysis was carried out on these three variables to determine whether they were highly correlated with each other or if they were sufficiently different to constitute independent measures of risk in their own right. A comparison of the averages of each variable across the five categories of Sub-Industry, Business Ethnicity, Size Category, Location and Business Gender was carried out to better understand the distribution of risk across these different categories.

In investigating the relationship between SME risk and its characteristics, the Dynamic Panel System GMM estimator was chosen as the regression model. This model allows for panel data to be regressed against a single dependent variable and uses lag observations of independent variables as instrumental variables in mitigating the threat of endogeneity in the regression model. This model is discussed in more detail in the next section, along with endogeneity.

The independent variables selected for this study are the SME characteristics that have been identfied in the literature as having the potential to affect SME risk. Using the GMM regression, this research aimed to determine to what extent a relationship between SME risk and these characteristics exists. By running GMM regressions on each of the three dependent variables with the same set of independent variables, this research compared, analysed and contrasted the different measurements of risk and their relationship with SME characteristics. This enables a better understanding of what affects the different measurements of risk and creates avenues for debate with regard to the supposed impact that these identified characteristics have on SME risk.

4.5.1 Selection of the regression model

In the process of selecting an appropriate regression model, this research first considered the use of the Ordinal Least Squares (OLS) regression, adapted for use with panel data as it is a commonly used and generalisable regression model. However, given that the dependent variables measured in this research are all non-parametric in distribution, the OLS regression cannot be used.

Quantile regression was then evaluated as a potential better selection to match the dataset in this research. Unfortunately, the dataset faces a high threat of endogeneity, especially in the form of loop causality, as the dataset contains financial figures which affect one another. Because of this endogeneity, quantile regression is not a suitable method for this research.

The next alternative considered was Quantile Instrumental Variable regression. This regression model combines the semi-parametric nature of the quantile regression together with instrumental variables to mitigate the threat of endogeneity.

However, the difficulty with this regression method is that the identification of instrumental variables is extremely challenging. Given that the dataset in this research in limited in terms of variables, the Quantile Instrumental Variable regression is unsuitable.

The Generalised Method of Moments dynamic data panel regression was eventually chosen as the regression model for this research as it is a semi-parametric regression which utilises the lag of the variables tested in the model as instrumental variables. This satisfies the non-parametric distribution of the data as well as mitigates the threat of endogeneity. This regression model is further explained in the following sections.

4.5.2 Dealing with Endogeneity

The Dynamic Panel System generalised method of moments (GMM) estimator was used to run the necessary panel regressions to determine the relationship between the variables. The GMM estimator is a semi-parametric statistical method which allows the time lag of variables to be used as instrumental variables in mitigating the effects of endogeneity in the model (Arellano & Bond, 1991; Wintoki, Linck, & Netter, 2012). In dealing with panel data, the OLS fixed-effects/random-effects model is commonly used by researchers to investigate the causal relationships between dependent and independent variables (Agrawal & Khan, 2011; Wintoki et al., 2012). However, using the panel OLS method does not overcome the issue of endogeneity, which is especially prevalent in business studies where several characteristics may be subject to measurement errors or simultaneity (Khwaja, Mian, & Zia, 2010; Wintoki et al., 2012).

In a model that does not have endogeneity, all variables are said to be exogenous, which means that they are all assumed to derive from external factors that then affect the dependent variable in the model. However, in practice, endogeneity can arise from many different factors, including errors in measurement, autoregression with autocorrelated errors, omitted variables and simultaneous causality (or simultaneity). In business research, common causes for endogeneity can be related to loop causality (where one variable affects the other and vice versa); for example, the relationship between business growth and performance (better performance leads to increased growth, which then increases performance). Endogeneity can also be related to confounding factors, which affect two variables but are not reflected in the model; for example, lower taxes increase the cost of debt and at the same time also increase profits.

If not checked for, endogeneity can bias the results of a regression and produce an inaccurate result that does not reflect the true nature of the relationship between the variables. Endogeneity is a concern for many researchers, as pointed out by Wintoki et al. (2012), who notes that earlier research on corporate governance and firm performance did not take into account the endogeneity of the variables being studied, thus calling their results into question. One of the most common methods of dealing with endogeneity in a model is the use of Instrumental Variable (IV) regression. IV regression uses instrumental variables that are correlated with the endogenous variables in the model but not correlated with the error term in the model (Arellano & Bover, 1995; Chernozhukov & Hansen, 2004). Ideally, these instrumental variables should also be exogenous to the model. IVs are derived from variables within the dataset but are not directly tested in the model. However, finding suitable IVs is often difficult in models with a high level of endogeneity,

where there are very few exogenous variables that can be tested. From this small pool of exogenous variables, it can be very difficult to find variables that can meet the criteria for use as an IV.

To this end, researchers have made use of lag variables in order to deal with models where endogeneity is a concern (Arellano & Bond, 1991; Forte et al., 2013; Morard et al., 2013). Lag variables are only applicable to panel datasets as they use the values of the previous observations in the time series as IVs to mitigate the presence of endogeneity in the model. The dynamic panel data generalised method of moments (GMM) is a good example of a panel data regression model that makes use of lag variables to overcome the problem of endogeneity in the dataset.

4.5.1 The Generalised Method of Moments (GMM) Technique

The GMM was first developed as a method that allowed researchers to evaluate a dataset where the full shape of the distribution function of the data may be unknown. The GMM relies on having a certain number of moment conditions specified for the model, which are functions of the model parameters and data. These moment conditions then have a certain norm of their sample averages minimised. The moments calculated from the variables in the dataset are said to approach asymptotic normality, which allows the GMM to work with non-normally distributed data (Arellano & Bond, 1991; Blundell & Bond, 1998). The GMM is used when the true value of a parameter, θ, must be found from a dataset of T number of observations, Y_t $(t = 1,2 \ldots . t)$. For the assumption to hold, Y_t needs to be a weakly stationary ergodic stochastic process. Moments conditions derived from the vector-valued function of $g(Y_t, \theta)$ are used to apply the GMM estimator. A positive-definite weighting matrix, W, is used to minimise a certain norm of θ, thus the GMM estimator can be described as:

$$\hat{\theta} = \arg\min \left(\frac{1}{T} \sum_{t=1}^{T} g\,(Y_t, \theta) \right)^{T} W \left(\frac{1}{T} \sum_{t=1}^{T} g\,(Y_t, \theta) \right) \qquad \textbf{\textit{(21)}}$$

Often, in order to calculate the value of the weighting matrix, *W*, the value of θ is required; however, the value of θ is what we need to calculate. To work around this, the two-step GMM method is used. In the first step, W = the identity matrix (or some other positive-definite matrix) is pulled from the dataset, Y_t and this is used to calculate a preliminary GMM estimate θ_1 , which is then fed back into the equation to derive the weighting matrix, thus creating a new estimate, θ_2 , which is deemed to be asymptotically efficient. This process can be repeated, giving rise to a method known as the iterative GMM, as the estimator becomes more efficient with each subsequent iteration. However, due to the limited computing capacities of modern PCs, the two-step method is generally more computationally efficient (Adusei, 2013; Feve & Langot, 1996)

Dynamic panel data models using the GMM estimator were discussed by Arellano & Bond (1991) who used the past, present and future values of strictly exogenous variables to construct instruments for the lagged dependent variables and other non-exogenous variables. In their research, their model (hereafter referred to as the Arellano-Bond estimator) was applied to an unbalanced panel dataset of employment information for UK companies where the exogenous variables were lagged. They found that the GMM estimators and the serial correlation tests performed well in this application. The Arellano-Bond estimator relies upon indentification of its instrumental variables using the same criteria used in IV regression. Furthermore, the instrumental variables used are not strictly exogenous. The Arellano-Bond estimator was further refined by Arellano and Bover (1995) and

Blundell and Bond (1998), showing that the use of time-invariant, strictly exogenous and pre-determined instrumental variables resuled in improved predictive ability. This model is now known as the 'system' GMM estimator, which has been shown to be more efficient than the non-linear GMM estimator (Blundell & Bond, 1998) as it uses forward orthogonal deviations in predicting the identity matrix instead of first-difference estimates. In the GMM estimator with panel datasets, an autoregressive panel data model of the following form is used:

$$y_{it} = \alpha_1 + \kappa_1 y_{i,t-1} + \beta x_{1it,t-1} + \beta x_{2it,t-1} + \ldots\ldots \beta x_{nit,t-1} + \eta_i + \varepsilon_{it} \qquad \textbf{(22)}$$

For i = 1,…..N and t = 2,….,T. The expression '$\eta_i + \varepsilon_{it}$' is the usual 'fixed effects' decomposition of the error term. The dependent variable is represented by 'y' and the explanatory variables by 'x' (Blundell & Bond, 1998; Wintoki et al., 2012).

4.6 Selection of Dependent Variable

4.6.1 Pure-play Beta

In Malaysia, the ACE Market of the Kuala Lumpur Stock Exchange lists companies that are SMEs according to the SME Corporation (Malaysia) definition. It is possible to obtain the relevant market information for these companies, calculate their market beta and use these betas as proxies in calculating a pure-play beta for unlisted SMEs operating within the same industries. Using the SSM database, it is possible to estimate the pure-play betas for the unlisted companies in that database using relevant proxies from the ACE market. It should be noted that prior to 2009, the ACE market was known as the MESDAQ market. All financial figures referring to the ACE market in the years before 2009 werer taken from the financial data of the MESDAQ market.

While Britzelmaier et al. (2013) used the pure play method as one of the means of calculating the beta for one fairly large German SME in their case study, the present research uses the pure play method to calculate the beta of a sample of Malaysian SMEs and has potentially greater generalisability and accuracy compared to previous research.

Unfortunately, not much has been written on the pure-play beta since 2007 (Collier & Grai, 2007) and the most recent research which references the pure-play beta was a study by Britzelmaier et al. (2013). Earlier research has pointed out the shortcomings of the pure-play beta, paticularly its inability to account for multi-division synergies, its inherent survivor bias and the low financial leverage of its proxy firms (Wood et al., 1992; Zivney, 1989). In this research, multi-division synergies were irrelevant as the firms studied were small, single-division firms.

Using the financial information provided by the SSM database, this research calculates the pure-play beta for the companies in the database using the adjusted pure-play beta formula described in section 4.5.2:

$$\beta_{ij}^{a} = \beta_{ij}^{u}\left(\frac{V_j - T_j \cdot D_j}{E_j}\right)$$

Where:

β_{ij}^{u} *= unlevered beta from the proxy firm*

E_j *= book value of the total equity of the SME*

V_j *= book value of the total capital (debt + equity) of the SME*

T_j *= the tax rate of the SME*

D_j *= book value of the total debt of the SME*

β_{ij}^{a} *= the adjusted pure-play beta*

Using the formula above as a guide, along with the relevant information from the database, this research uses the 'adjusted pure-play beta' (otherwise known as the PP beta) as its main dependent variable in measuring SME risk.

The pure-play beta method requires the use of ungeared proxy betas from companies listed on the stock exchange. Using Datastream, this research created a list of all the companies listed on the small market capitalisation stock exchange in Malaysia, known as the ACE Market. From this list, information such as the company's operating industry, annual sales and ungeared beta was found. In order to match the dataset provided by SSM, data were extracted from this sub-dataset of ACE market companies for the years 2005 to 2014.

Following the approach of Fuller & Kerr, (1981), this research matches ungeared proxy betas from companies listed on the ACE market to matching observations from the SSM database. Matches were based on the following criteria:

1. Being of similar size (size is calculated by annual sales – as per Malaysian Government definitions): specific numerical codes were assigned to each observation from the ACE market and each observation from the SSM database using the following guidelines.

Table 10: Pure-play beta size designations

Total Sales Value	**Code**
total sales<150,000	1
150,000<total sales<300,000	2
300,000<total sales<1,000,000	3
1,000,000<total sales<3,000,000	4
3,000,000 <total sales<5,000,000	5

5,000,000<total sales<10,000,000	6
10,000,000<total sales<15,000,000	7
15,000,000<total sales<20,000,000	8
20,000,000<Total sales<30,000,000	9
30,000,000<Total sales<40,000,000	10
40,000,000<Total sales<50,000,000	11

2. Being in the same industry (as per the broad classifications supplied by the Malaysian Government). This involves determining whether a company was in the Manufacturing, Services, Primary Agriculture, Construction or Mining category. Because construction and mining are removed from the sample, only the first three categories are considered. As in the previous step, each observation in the ACE market and the SSM database was assigned a code for its matching sub-industry.
3. Being in the same year of operation. This ensures that the observations matched up with each other in terms of the operating year. This way, ungeared proxy betas calculated for 2006 were matched with unlisted company observations from 2006 and so on.

Each observation in both the ACE market and SSM datasets was assigned a unique code based on a combination of sales level, industry and operating year. An example of a code would be '2006-2-06' which indicates a 2006 observation for a '2' (services) company with a sales level of '6' (between RM 5,000,000 and RM 10,000,000 a year). Proxy ungeared betas from the ACE market were then assigned to observations in the SSM dataset with matching codes. However this method resulted in a number of observations in the SSM dataset that could not be used,

because they did not have matching codes from the ACE market dataset. These observations were subsequently removed.

After assigning each observation in the SSM dataset an ungeared proxy beta, this beta was then used in the computation to derive the adjusted pure-play beta (using the formula outlined in previous chapters), which was used as the final value representing SME risk, the pure-play beta.

4.6.2 Accounting Beta

The accounting beta has been the subject of much research regarding the estimation of risk for unlisted entities. Beaver et al. (1970) and Almisher and Kish (2000) both find that the accounting beta can predict the market returns of a company and their potential IPO returns respectively. However, Beaver et al.(1970) point out that it is entirely possible that accounting risk could affect market risk and that it could cause investors to behave in a certain way. St. Pierre and Bahri (2006), however, do not consider it is a suitable measure for unlisted businesses. Despite its shortcomings, the accounting beta is a relatively easily calculated measure of risk, which uses readily available historical financial records of a business entity. However, it needs to be compared against the average returns of a portfolio of similarly sized business entities.

For this research, the following accounting beta calculation, covered in section 4.5.1, is used (Ball & Brown, 1969; Hill & Stone, 1980; Vos, 1992):

$$Accounting\ \beta = \frac{\Delta ROE_i}{\Delta ROE_m}$$

Where:

$$\boldsymbol{ROE\ (Return\ on\ Equity) = \frac{Earnings\ before\ interest\ and\ tax}{Total\ Equity}}$$

i = company/security

m = market portfolio

The change in ROE for the company security is calculated as the year on year change of the ROE for each company's observation. In the final year of observation for each company, the percentage change for the previous year of observation was used as a forecast of its change in ROE. Holmes, Hutchinson, Forsaith, Gibson, and McMahon (2003) mention that the market portfolio is represented as the portfolio to which the security belongs to, therefore for the purposes of this research, the entire dataset is treated as the 'market portfolio' in which the accounting beta is based. This selection also allows for better comparability between the companies in the dataset that share similar traits. In calculating the average ROE for the companies in the dataset, the following table is derived:

Table 11: Average and change in ROE for dataset by year

Year	**Average of ROE**	**ΔROE(m)**
2005	0.149938536	-1.29165
2006	-0.043729302	-8.89629
2007	0.345299212	-4.28812
2008	-1.135384782	-0.97784
2009	-0.025161152	-3681.83
2010	92.61393713	-0.99965
2011	0.032452772	0.526628
2012	0.049543319	-10.8205
2013	-0.486541316	-1.19893
2014	0.096786867	-1.19893

The average change in ROE for each year was matched to its according year for each change in ROE for the companies in the dataset and from that calculation, the accounting beta for each observation was derived.

4.6.3 Probability of Survival

The estimation of an SME's probability of default represents the likelihood that an SME will default on its loans and enter receivership, signalling the 'failure' of the business. While originally conceived as a way of estimating the probability of default for listed companies, several models have subsequently been developed to predict the probability of default for SMEs (Abdullah et al., 2014; Altman & Sabato, 2007; Edmister, 1972). The risk captured by the probability of default models is reflective of the operational risk faced by the business owner dealing with the prospect that his/her business could fail. The probability of survival is the difference in the beta measurements (which are relative measurements of market risk) but it can be used to calculate the SME's probability of survival. This probability of survival (PS) can be fed into Cheung's (1997) probability model to calculate the required return for the SME, thus making it comparable with the CAPM, which the beta models feed into.

This study used the models developed by Abdullah et al. (2014) in their analysis of Malaysian SMEs, because of the similar research context and use of a similar database.

Table 12: Abdullah et al.'s probability of default models

Model 1	$Log\left(\frac{PD}{1-PD}\right) = -a + b(total\ liabilites\ to\ total\ assets) - c\ (EBITDA\ to\ total\ assets)$

Model 2	$Log\left(\frac{PD}{1-PD}\right) = a + b(total\ liabilites\ to\ total\ assets) - c(EBITDA\ to\ total\ assets) - d(Ln\ Firm\ Age)$

The information required to run the models was derived from the financial and non-financial information of the sample companies. The result of the models were inverse logged in order to derive the PD (probability of default) percentage. The models in Table 9 were used to calculate the PD for two years prior to failure, therefore the PD for the next year could be estimated by assuming that:

$$PD^n = PD\ from\ model \qquad (23)$$

Where:

n = prediction of failure within 'n' years

Therefore:

$$PD^2 = PD\ from\ model \qquad (24)$$

$$PD = \sqrt{PD\ from\ model} \qquad (25)$$

Cheung's probability model calls for a *p* value to be reflective of the business' survival rate. Therefore the PD percentage calculated from the models above needs to be subtracted from one in order to determine the PS (probability of survival) or the *p* value as required by Cheung's model:

$$PS = 1 - PD \qquad (26)$$

Using these calculations, this study was able to calculate the probability of survival (PS) in a format that could be inputted into Cheung's model, as covered in section 4.5.3 (Cheung, 1999):

$$k_e = \frac{R_f}{p} + \frac{1-p}{p}$$

Where:

k_e = *cost of equity*

R_f = *risk-free rate of return*

p = *probability of business survival*

This research only focuses on the PS as the dependent variable to facilitate better comparison with other risk measures such as the PP beta and the accounting beta. Cheung's model calculates the cost of equity, otherwise known as the required return on equity, which is not a risk but a return measure.

4.7 Independent Variables Used in the Research

Chapter 4 outlined all the potential SME characteristics that can potentially affect SME risk, based on research done in the literature. However, given the constraints of the dataset, this research uses the following independent variables, all of which were present in the final dataset provided by SSM:

1. Financial Performance:
    a. Net profit margin
    b. Return on assets
2. Capital Structure
    a. Debt to equity ratio
    b. Current ratio
3. Education and experience (proxied using owner age)
4. Concentration of ownership (proxied using largest share percentage)
5. Gender of business owners*
6. Ethnicity of business owners*

7. Size of firm*
8. Age of firm
9. Sub-industry of firm*
10. Location of firm*

**These categorical variables have their categories reduced to two broad categories to reduce the risk of over-identification when running the regression.*

The following table describes how the independent variables are calculated and/or classified:

Table 13: Independent variables description

Independent Variable	**Formula**	**Description**
Profit after tax to sales ratio (Profit Margin)	$\frac{Profit\ after\ tax}{Net\ sales\ income}$	Numerical variable used to measure business profitability.
Profit after tax to total assets ratio (Return on Assets)	$\frac{Profit\ after\ tax}{Total\ assets}$	Numerical variable used to measure business return on assets.
Debt to Equity ratio	$\frac{Total\ debt}{Total\ equity}$	Numerical variable used to measure business leverage.
Current ratio	$\frac{Current\ assets}{Current\ liability}$	Numerical variable used to measure business gearing.
Owner age	*Average age of owners at each date of observation*	Numerical variable which measures the average age of all shareholders in the business.
Largest share percentage	$\frac{No.of\ shares\ held\ by\ largest\ shareholder}{Total\ amount\ of\ shares} X\ 100$	Numerical variable (percentage) which measures the percentage of shares held by the largest shareholder (to measure concentration of ownership).

Gender of business owners (Gender)	*Base = Female/Mixed Gendered* *1=Purely Male owned*	Categorical variable which categorises businesses according to the gender of their owners.
Ethnicity of Business Owners (Ethnicity)	*Base = Purely Chinese owned* *1=Non-Chinese/Mixed Ethnicity*	Categorical variable which categorises businesses according to the ethnicity of their owners.
Size code	*Base = Micro and Small size* *1 = Medium size*	Categorical variable which categorises businesses into sizes as defined by the Malaysian government.
Firm age	$Date\ of\ observation - founding\ date\ of\ business$	Numerical variable used to measure how many years the business has been in operation.
Sub-industry	*Base = Services/Others* *1 = Manufacturing*	Categorical variable which categorises businesses into their respective operating sub-industries.
Town code	*Base = Rural/Minor urban* *1 = Major Urban Centre*	Categorical variable representing the population density of the town where business is located.

4.8 Control Variables

In this research, a selection of control variables are regressed against the risk measures to determine whether there is any influence from factors not identified in the independent variables. The control variables used in this research are:

1. Total Assets
2. Total Equity
3. Total Debt

These control variables are chosen because, taken together, they reflect the overall value of a company and it is important to consider whether there is any additional impact from these figures on the risk measures.

4.9 Hypothesis Development

From the dependent and independent variables outlined in the previous sections, this research proposes the investigation of the following hypotheses, created as alternatives to the null hypotheses suggested in Chapter 4:

4.9.1 Financial Performance

Profitability is commonly associated with business performance and as such has the potential to significantly affect a business's level of risk. Existing research suggests that profitable businesses are more stable in the long run and are thus less risky (Janssen, Moeller, & Schlafke, 2011; Kolari et al., 1997). However, the risk-return relationship theory suggests that the riskier a business is, the higher its return (profitability) (Purdy, 1997; Sharpe, 1964). This research investigated the possible relationship between SME profitability and SME risk, with the direction of that relationship being investigated in the model.

Hypothesis 1a: There is a significant relationship between an SME's profit margin and SME risk.

Hypothesis 1b: There is a significant relationship between an SME's return on assets and SME risk

Profitability is represented by the 'Profit after tax to sales ratio' and the 'Profit after tax to total assets ratio' variable.

4.9.2 Capital Structure

Capital structure is taken to mean the balance of debt and equity used by the business to fund its operations. SME risk is often defined by its capital structure, with several authors suggesting that businesses with a larger amount of debt capital are prone to risk (Chen et al., 2010; Ingrassia, 2012; Scherr et al., 1993). Equity is generally treated as less risky than debt, therefore the capital structure used by a business can determine its riskiness. The current ratio is used to determine a business's liquidity, which is a reflection of its capital structure choices (Edmister, 1972).

Hypothesis 2a: There is a significant relationship between an SME's debt to equity ratio and SME risk.

Hypothesis 2b: There is a significant relationhsip between an SME's current ratio and SME risk

Capital structure is represented by the 'Debt to Equity ratio' and the 'Current ratio' variable.

4.9.3 Owner Age

Older, more mature entrepreneurs are said to provide better management and stability to their businesses as compared to younger entrepreneurs (Ivanova, 2009; Schulze et al., 2001; Smith, Baum, & McPherson, 2008). This implies that the older the average age of the owners, the less risk the business will face.

Hypothesis 3: There is a significant relationship between the age of SME owners and SME risk

Owner age is represented by the 'Owner age'variable

4.9.4 Largest Share Percentage

Literature investigating principal-principal conflict implies that the larger the concentration of ownership in the hands of one entity, the higher the risk the business faces from principal-principal agency cost (Banchit & Locke, 2011; Z. Wu, Chua, & Chrisman, 2007; Young et al., 2003). This means that the higher the concentration of ownership in a single business, the higher its risk will be.

Hypothesis 4: There is a significant relationship between the largest share percentage and SME risk.

The largest share percentage is represented by the 'Largest share percentage' variable.

4.9.5 Business Gender

Gender is said to play a role in influencing an SME's access to funds and also its performance. Research suggests that women business owners face greater challenges in obtaining business loans and growing their business as compared to male business owners (Haughwout et al., 2009; Kyaw & Routray, 2006; Rasheed, 2004). In the regression, the three categorisations of gender-ownership (female-owned, male-owned and mixed-gendered) are reduced to two categories with female-owned and mixed-gendered combined into a single category. The female-owned and mixed-gendered groups are used as the base because of the higher number of observations as compared to the male-owned category.

Hypothesis 5: The gender of the owners of an SME can significantly affect its beta.

The gender of the business owners is represented by the 'Business gender' variable.

4.9.6 Business Ethnicity

The ethnicity of the business owners can influence an SME's access to funds, its performance and the level of operational challenges it faces (Danes & Lee, 2008; Rasheed, 2004). This is especially true in Malaysia, where affirmative action policies are in place favouring members of the Bumiputra race for various business grants and loans (Gomez, 2003, 2012). In the regression, the four ethnic categorisations are reduced to two, which are Non-Chinese/Mixed Ethnicity and Chinese-owned. Chinese-owned businesses are used as the base as they have more observations as compared to Non-Chinese/Mixed Ethnicity.

Hypothesis 6: The ethnicity of the owners of an SME can significantly affect its risk.

The ethnicity of the business owners is represented by the 'Ethnicity' variable.

4.9.7 Firm Size

Literature on business survivability and risk argues that the smaller a business is, the higher the risks it faces in operating as a going concern. Larger firms are treated as less risky due to their size and ability to absorb losses in the event of economic downturns (Ali et al., 2010; Evans, 1987b; Pagano & Schivardi, 2003). In the regression, the three size categories used by the Malaysian government to classify SMEs are reduced to two categories, Micro/Small businesses and Medium businesses. Micro/Small businesses are used as the base as they have a larger number of observations.

Hypothesis 7: There is a significant relationship between an SME's firm size and its beta

The firm size is represented by the 'Size code' variable.

4.9.8 Firm Age

The literature suggests that the older a business is, the more likely it is to continue operating (Evans, 1987b; Lundvall & Battese, 2000; Yasuda, 2005). This would imply that older businesses face less risk. Young businesses are generally more prone to failure, implying a higher risk value for SMEs (Ahmad & Seet, 2009; Everett & Watson, 1998).

Hypothesis 8: There is a significant negative relationship between the age of an SME and its beta.

Firm age is represented by the 'Firm age' variable.

4.9.9 Sub-Industry

The industry in which an SME operates can determine its riskiness, as different businesses operating in different environments will face different operating challenges,and some industries may be riskier than others (Fama & French, 1997; Mergner & Bulla, 2008; Ragunathan et al., 2000). The three industrial categories are reduced to two for the regression: Services/Other (including primary agriculture) and Manufacturing. Services/Other is used as the base due to the larger number of observations in this category.

Hypothesis 9: There is a significant relationship between the sub-industry of an SME and its risk.

The sub-industry is represented by the 'Sub-industry' variable.

4.9.10 Geographic Location

Businesses located in urban centres are likely to show better performance and be less prone to the risk of failure; however, being in urban centres also means that

higher competition can increase the overall risk of the business (Barringer & Greening, 1998; Brenner et al., 2010; Hanson, 2005a). This research investigated the nature and direction of this relationship. The three categorisations of location were reduced to two for the regression, with rural/minor urban as one category and major urban as the other. Rural/urban is used as the base because of the larger number of observations in that category.

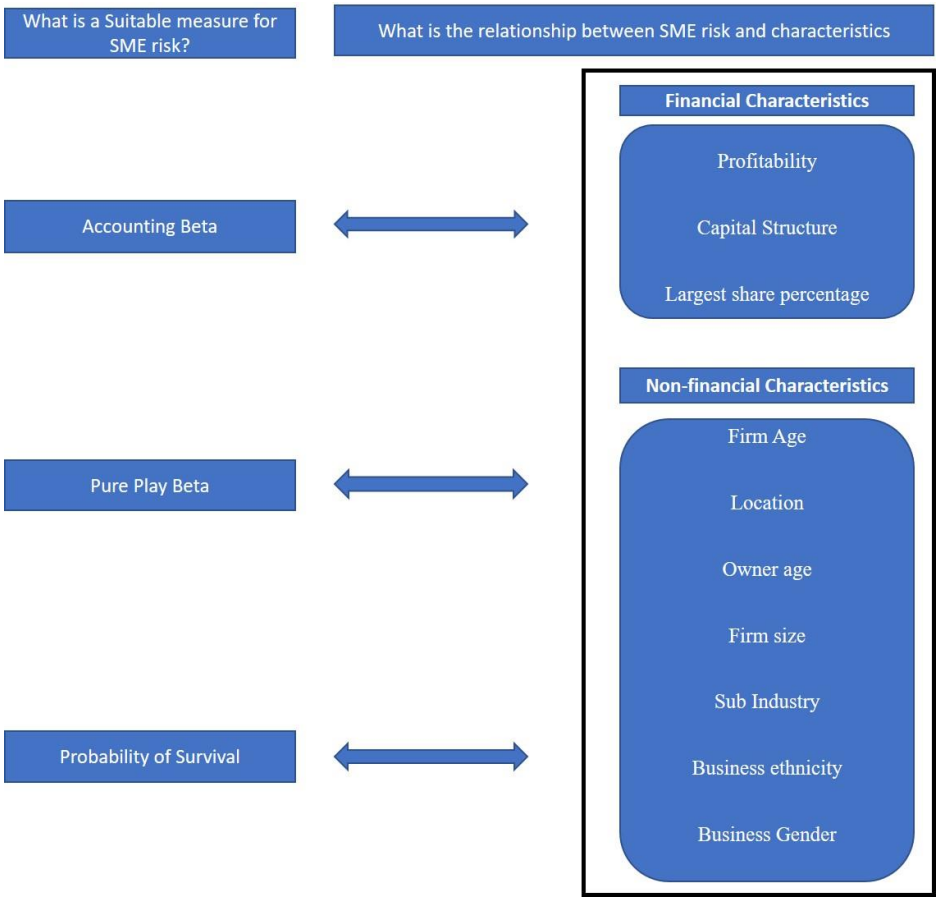
Hypothesis 10: There is a significant relationship between the location of an SME and its risk.

Geographic location is represented by the 'Town code' variable

4.9.11 Theoretical framework

From the hypothesis development in the previous sections, this research proposes the following theoretical framework:

Figure 11 Theoretical Framework



This theoretical framework suggests that there is a relationship between the risk measures as represented by the Accounting Beta, the Pure Play Beta and the Probability of Survival measure under the heading of 'What is a suitable measure of SME risk?' (The first research question) with the financial and non-financial characteristics represented by the items grouped under the heading of 'What is the relationship between SME risk and characteristics?' (The second research question). This relationship is represnted by the arrows pointing from the characteristics towards the risk, indicating that these characteristics affect the risk and not the other way around.

4.10 Chapter Summary

This chapter has outlined the source and nature of the data used in the research and the proposed research methods. In doing so, the dependent and independent variables have been identified and explained. This chapter also refers back to the original research questions relating to finding a suitable measurement for SME risk and the relationship between SME risk and SME characteristics. The next chapter discusses the regression model used in this research.

5 Findings

5.1 Introduction

In this chapter, the model used in the research is specified and the statistical results are discussed. A clear explanation is provided for the various assumptions made in the model specification and the validity of the subsequent tests of auto-correlation, over-identification and instrument exogeneity.

The results are discussed according to their respective hypotheses, indicating whether the hypothesis is rejected or not. Using knowledge from prior literature, this chapter discusses the implications of the statistical findings based on the model that has been produced.

In earlier chapters, the development of risk measurement techniques and their use in SMEs were discussed, as were the various characteristics that can affect SME risk. This chapter discusses the use of the different measurements on a dataset of Malaysian SMEs and the relationship between the measured risk and SME characteristics. The perspective of agency theory, combined with risk and return theory, are drawn upon to develop a picture of the issues involved in SME risk and operations. The measures used in this chapter aim to capture the risk exposure faced by the SME and the characteristics analysed represent aspects of SME operation that affect their risk.

This chapter analyses the relationship between different risk measures and SME characteristics. By doing so, the analysis answers the five main research questions:

1. What is a suitable measure of SME beta to calculate required return?

2. What is a suitable measure of SME survivability to calculate required return?
3. What is the relationship between SME risk and its financial characteristics?
4. What is the relationship between SME risk and its owners' characteristics?
5. What is the relationship between SME risk and its firm characteristics?

What is the relationship between SME risk and its firm characteristics?The first and second questions are answered by running a correlation matrix between the SME risk measures and SME characteristics in the research. The risk measure with the most number of significant correlations can be implied to have a greater accuracy in estimating SME risk.

The remaining questions are answered by running a GMM regression for each SME risk measure, regressed against a series of SME characteristics to determine the relationship between the risk measure and the characteristics. The important observation here is whether these characteristics impact SME risk as they are implied to in the literature.

The five main research questions outlined earlier are answered by careful analysis of the results generated by the statistical methods applied in this chapter.

5.2 Correlation matrix analysis

Given the non-parametric distribution of data in this research, the Kendall-tau correlation matrix is used to evaluate the correlation between the different variables used in this research. The categorical variables are not included in the correlation because the correlation matrix is unable to compute the correlation between continuous and categorical variables.

Table 14: Correlation matrix

	PP Beta	Accounting Beta	PS Model 1	PS Model 2	Total Sales	Debt to Equity	Total Debt	Total Assets	Current Ratio	Profit Margin
PP Beta	1.000									
Accounting Beta	0.0495*	1.000								
PS Model 1	-0.218*	-0.016	1.000							
PS Model 2	-0.1644*	-0.027	0.2124*	1.000						
Total Sales	-0.714*	0.002	0.0816*	0.1143*	1.000					
Debt to Equity	0.4406*	0.0367*	-0.3647*	-0.2693*	0.000	1.000				
Total Debt	0.0841*	0.001	-0.0984*	0.1355*	0.4275*	0.2312*	1.000			
Total Assets	-0.0849*	-0.027	0.0490*	0.2937*	0.4147*	-0.086	0.6826*	1.000		
Current Ratio	-0.2829*	-0.025	0.2698*	0.1263*	-0.018	-0.5750*	-0.3036*	-0.0533*	1.000	
Profit Margin	-0.1101*	-0.004	0.6441*	0.2259*	0.0470*	-0.2015*	0.0537*	0.1596*	0.1147*	1.000
Return on Assets	-0.1112*	0.002	0.7731*	0.1357*	0.0915*	-0.1753*	-0.0398*	0.013	0.1376*	0.7118*
Firm Age	-0.1428*	-0.026	0.0557*	0.8206*	0.1103*	-0.2196*	0.1649*	0.3073*	0.0828*	0.0937*
Owner Age	-0.0995*	-0.018	0.027	0.2686*	0.024	-0.1334*	0.022	0.1138*	0.0558*	0.0343*
Concentration of Ownership	-0.0405*	0.013	0.011	0.0594*	0.011	0.0679*	0.019	0.0839*	0.0779*	0.012
Return on Equity	0.0345*	0.018	0.5263*	0.025	0.0710*	0.0565*	0.013	-0.0294	-0.0184	0.5646*
Total Equity	-0.3104*	-0.0352*	0.2346*	0.3689*	0.3097*	0.4583*	0.3104*	0.6278*	0.2211*	0.2413*

	Return on Assets	Firm Age	Owner Age	Concentration of Ownership	Return on Equity	Total Equity
Return on Assets	1.000					
Firm Age	-0.018	1.000				
Owner Age	-0.025	0.2817*	1.000			
Concentration of Ownership	-0.015	0.0591*	-0.0160	1.000		
Return on Equity	0.7092*	-0.1113*	-0.0621*	-0.260	1.000	
Total Equity	0.1149*	0.3543*	0.1528*	0.0761*	-0.0351*	1.000

Table 14 shows the correlation between the risk measures (PP beta, accounting beta, PS Model 1, PS Model 2) and the characteristics analysed in this research. The table shows that PP beta is, at the 0.05 level, significantly correlated with all the variables tested, including the other risk measures as well. This implies that PP beta has a relatively reliable degree of predictability in determining the values of the other variables. It can also be argued that from these results, PP beta seems to be the most reliable form of risk measure for SMEs in this dataset. However, since variables such as the debt to equity ratio, total equity, total debt and total assets are key input variables in the calculation of PP beta, it is expected that these variables would be strongly correlated with it.

The accounting beta fared poorly compared to the PP beta, being significantly correlated only with the debt to equity ratio and the total equity ratio, which is not surprising given that the accounting beta is calculated based on the year on year change in return on equity. However, somewhat interestingly, the accounting beta was not significantly correlated with return on equity in this case. The accounting beta is not significantly correlated with any of the other variables (except PP beta) and does not seem to be a good supplementary indicator of risk that can be used alongside other measures of risk at this point.

The probability of survival (PS) model 1 predicts the survivability of an SME based on the input figures of the debt to asset ratio and the return on asset ratio. In terms of correlation, it is highly correlated with all the other variables, except for accounting beta, owner age and the concentration of ownership. This low correlation with accounting beta is likely due to the PS model being more focused on the interaction between assets, debt and return, whereas the accounting beta is built upon the change in the return on equity. Not surprisingly, the return on asset

figure is highly correlated with the PS model due to it being an input figure in its calculation. The correlation matrix implies that the probability of business survival, treated as a potential risk to the SME, has a certain degree of correlation with the SME characteristics which affect SME risk.

The PS model 2 has essentially the same results as the PS model 1, with the main difference being the addition of firm age as an input figure in its calculation. Abdullah (2014) finds that the PS Model 2 has a greater degree of accuracy in predicting the survival rate of a SME compared to Model 1. In the correlation matrix given, the PS Model 2 is highly correlated with all the variables, save for accounting beta and ROE. The reasons for its lack of correlation with accounting beta are similar to that for the PS Model 1. Interestingly, PS Model 1 has a significant correlation with ROE, but PS Model 2 does not. This implies that the addition of the firm age variable skews the prediction of the PS Model 2 to favour the age of the business and its owner (Firm and Owner age) over the returns generated by the business. Nonetheless, the results of the correlation matrix suggest that PS Model 2 is a better measure of SME risk than PS Model 1.

The initial results given by the correlation matrix suggest that PP beta is the most accurate measure of SME risk for this particular dataset. Given its significant correlation with all the variables across the board, it seems that for this selection of financial and numerical SME characteristics, PP beta is the best measure of risk for the purposes of calculating the required return on an SME or determining its cost of capital. However, given the shortcomings of the correlation matrix, categorical variables cannot be measured in this analysis, hence this research uses the dynamic data panel GMM regression to determine the relationship between the risk measures and SME characteristics.

5.3 Dynamic panel data GMM regression

As explained in the previous chapter, the GMM regression is a type of regression analysis that helps to mitigate issues of endogeneity in the dataset. In conjunction with the use of a panel dataset, the GMM regression can use lag instrument variables to deal with endogeneity, instead of relying on the identification of external instrument variables, as is the case with instrumental variable regressions. This chapter outlines the use of the GMM model in this research and its analysis.

5.4 Model specification

This study ran a separate model for each risk measure and compared and contrasted the results against one another. Four models were run, following the structure of the following equation:

$$y_{it} = \alpha_1 + \kappa_1 y_{it-1} + \beta X_{it-1} + \gamma Z_{it-1} + \eta_i + \varepsilon_{it} \qquad (24)$$

'y' represents the dependent variables being tested, the lag of which is also tested in the model with a lag function of 't-1' (Lag 1).

'X' represents the independent variables in the equation, and each risk measure is regressed against a slightly differing mix of independent variables to avoid regressing them against components of their calculation. The independent variables are also tested in the model with a lag function of 't-1'. This is done to prevent an over-identification of instruments (Blundell & Bond, 1998; Wintoki et al., 2012). 'Z' represents the control variables put in the regressions and these include the total debt, equity and asset figures respectively, although given that some of them are components of the various risk measures used, they were not used in all of the four models.

The Arellano-Bond AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, with the null hypothesis of no serial correlation: a rejection of this at the 0.05 level means that there is serial correlation in the model. The Sargan and Hansen test of over-identification is conducted with the null hypothesis that all instruments are valid: a rejection of this at the 0.05 level means that the instruments are over-identified and may be invalid. The Hansen test is only available when using the two-step and is preferred to the Sargan test when interpreting the results (Blundell & Bond, 1998). The Diff-in-Hansen test of exogeneity is conducted under the null hypothesis that instruments used for the equations in levels are exogenous: a rejection of this at the 0.05 level means that the instruments are not exogenous. Hansen values of 1.000 are considered to be highly suspect, even if they indicate an acceptance of the null hypothesis, and can indicate a lack of completeness in data or other issues with the model (Blundell & Bond, 1998; Wintoki et al., 2012)

The instruments used in the GMM estimations are D_{it} and E_{it} , which represent Total Debt and Total Equity respectively. These variables were taken from the dataset as well but not tested for in the regression. These variables were selected as instrumental variables because they were used in calculating the PP beta variable.

The model is calculated using the System GMM method (Arellano & Bover, 1995; Blundell & Bond, 1998) which is more asymptotically efficient than the Difference GMM (Arellano & Bond, 1991) as it makes use of forward orthogonal deviations instead of first differences in estimating the identity matrix used in the equation. The two-step method of calculation is used together with a Windmeijer robustness correction measure which is more accurate and less biased than the first-step method (Blundell & Bond, 1998; Wintoki et al., 2012). The lag instruments used in

the equation are 'collapsed' instead of generated for each time period in order to prevent over-identification (Roodman, 2006).

Table 15: Tests of collinearity/exogeneity/overidentification

Validity Testing/Risk Measure	**PP Beta**	**Accounting Beta**	**PS Model 1**	**PS Model 2**
Arellano-Bond test for AR(1) in first differences [Pr>z]	0.041	0.639	0.001	0.000
Arellano-Bond test for AR(2) in first differences [Pr>z}]	0.286	0.231	0.157	0.351
Sargan Test for overidentification [Prob > chi]	0.000	0.000	0.000	0.002
Hansen Test for overidentification [Prob > chi]	0.815	0.976	0.977	0.992
Difference-in-Hansen tests of exogeneity of instrument subjects:				
GMM Instruments for levels				
Hansen test excluding group: [Prob > chi]	0.634	0.928	0.955	0.995
Difference (null H= exogenous): [Prob > chi]	0.961	0.951	0.871	0.479
Number of Observations	1184	1184	1184	1184
Number of Groups	271	271	271	271
Average Obs. Per group	4.37	4.37	4.37	4.37
Number of Instruments	227	249	210	215

Table 16: Regression table

	PP Beta		Accounting Beta		PS Model 1		PS Model 2	
	coeff.	p	coeff.	p	coeff.	p	coeff.	p
Dependent L1.	-0.00250	0.864	-0.16597	0.000	-0.03450	0.658	0.66132	0.000
Industry								
Services/Other	-	-	-	-	-	-	-	-
Manufacturing	-7.71110	0.490	187.72370	0.206	-0.11288	0.655	-0.34136	0.285
Size								
Micro/Small	-	-	-	-	-	-	-	-
Medium	0.54613	0.790	23.87865	0.303	0.01648	0.581	-0.00820	0.876
Size L1.								
Micro/Small	-	-	-	-	-	-	-	-
Medium	-0.34900	0.737	22.32541	0.184	-0.00632	0.595	-0.03881	0.110
Location								
Rural/Minor City	-	-	-	-	-	-	-	-
Major City	8.15154	0.321	35.43383	0.484	0.20384	0.144	0.30420	0.156
Business Ethnicity								
Wholly Chinese-owned	-	-	-	-	-	-	-	-
Mixed ownership/others	1.74558	0.867	-94.25647	0.100	-0.06185	0.670	-0.10747	0.649
Business Gender								

Female/Female-Male Ownership	-	-	-	-	-	-		-
Male Ownership	-12.33951	0.025	-49.49252	0.412	-0.25455	0.042	-0.40700	0.064
Debt to Equity Ratio								
--	NA	NA	-0.05561	0.030	NA	NA	NA	NA
L1.	NA	NA	-0.02374	0.362	NA	NA	NA	NA
Current Ratio								
--	-0.00005	0.993	-0.04563	0.251	-0.00001	0.920	-0.00010	0.428
L1.	0.00654	0.226	0.00783	0.860	-0.00007	0.434	-0.00001	0.932
Profit Margin								
--	-1.0383	0.003	1.40274	0.418	0.01056	0.021	0.00127	0.681
L1.	-0.1451	0.509	1.52460	0.392	0.00025	0.928	-0.00890	0.114
Return on Assets								
--	24.47796	0.000	-31.60816	0.193	NA	NA	NA	NA
L1.	1.42531	0.391	-31.11909	0.109	NA	NA	NA	NA
Return on Equity								
--	-8.70480	0.000	NA	NA	0.00479	0.158	0.00437	0.050
L1.	0.01512	0.788	NA	NA	0.00051	0.085	-0.00057	0.373
Firm Age								
--	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	NA	NA
L1.	0.00224	0.994	0.65719	0.822	-0.00255	0.603	NA	NA
Owner Age								

--	0.15805	0.984	-55.26688	0.390	0.24376	0.005	0.12888	0.322
L1.	-0.81034	0.920	53.19973	0.393	-0.24432	0.005	-0.11307	0.381
Concentration of Ownership								
--	20.21606	0.281	239.16280	0.253	0.10991	0.673	0.15596	0.704
L1.	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Control Variables:								
Total Sales								
--	4.08E-08	0.750	-1.02E-06	0.613	-5.07E-10	0.862	-4.25E-09	0.246
L1.	-1.41E-07	0.366	3.49E-07	0.773	-2.33E-09	0.380	-3.04E-10	0.922
Total Debt								
--	NA	NA	1.44E-06	0.375	NA	NA	NA	NA
L1.	NA	NA	-3.22E-06	0.434	NA	NA	NA	NA
Total Assets								
--	NA	NA	1.29E-06	0.444	NA	NA	NA	NA
L1.	NA	NA	2.14E-06	0.341	NA	NA	NA	NA
Total Equity								
--	NA	NA	NA	NA	7.22E-09	0.156	8.58E-09	0.027
L1.	NA	NA	NA	NA	-8.91E-09	0.126	-1.18E-08	0.009
_cons	15.81581	0.355	-7.86561	0.949	0.39645	0.112	-0.75827	0.040

5.5 Discussion

The regression table (Table 16) shows the results from the dynamic panel data GMM regression carried out separately on each of the risk measures identified (PP beta, accounting beta, PS Model 1 and 2). The significant relationship between the Dependent L1 for the accounting beta and PS Model 2 with their current observation is sufficient reason to use GMM as a means of mitigating endogeneity. The Dependent L1 for PP beta and PS Model 1, however, have non-significant relationships with their current observation. GMM is still used to maintain uniformity and comparability across the different risk measures.

The use of lag dependent variables as instruments is necessary to mitigate the threat of endogeneity in the regression model. While lag instruments can be incorporated in an OLS regression, the non-normal distribution of the risk measures, covered in the previous chapter, requires a semi-parametric approach, like the GMM. Some of these lag observations have a significant relationship with the risk measures, indicating a delayed effect of certain characteristics on SME risk.

GMM is used to mitigate the risk of endogeneity with its use of lag variables as instruments. Its semi-parametric nature allows it to be used with non-normally distributed data. As mentioned in the previous chapter, GMM relies on having a certain number of moment conditions specified for the model, which approach asymptotic normality, allowing non-normally distributed data to be used in GMM regressions.

The rest of the section is further divided into sub-sections discussing the results of each SME characteristic tested in the model.

5.5.1 Industry

Different sub-industries are said to have different financing requirements, from capital-intensive businesses such as manufacturing to small, service-based businesses that can be run from home. Table 16 shows there is no significant difference between being a Service/Other business and a Manufacturing business. The values for the lag variable for industry were unavailable across all categories due to collinearity; however, given that businesses generally do not change industries on a yearly basis, it is safe to assume that the lag observations would have similar results to the current (base year) observation.

According to the literature, the type of industry the SME is in may affect the amount of risk it faces only if there are specific industry-wide effects that affect one industry and not another (Carrieri, Errunza, & Sarkissian, 2004; Fama & French, 1997; Mamun & Mishra, 2012). A good example is the 2008 sub-prime mortgage crisis, which caused a lot of financial institutions and insurance providers to go under, creating industry-specific conditions that created risk unique to financial institutions and their related businesses (Longstaff, 2010; Phillips & Yu, 2011). However, financial institutions are not represented in this dataset, explaining why no change is observed, despite 2008 and 2009 being years of observation.

From a sectoral point of view, the PP beta is based on using a proxy beta from a business from a similar industry listed on the market; therefore any sectoral differences should be captured through the PP beta measurement. However the regression results for PP beta show that there are no significant differences between the industries, implying that the type of industry the SME belongs to does not affect its overall risk. Looking at the accounting beta and both PS Models, which represent

a performance and survivability point of view respectively, this seems to be the case as well. The magnitude of the coefficient between PP beta, PS Models 1, 2 and industry is also small. Interestingly there is a very large coefficient value of 187.7 between the accounting beta and industry, indicating an impact on the risk measured by accounting beta. However the p-value for the accounting beta regression indicates no significant relationship between the two.

In their work regarding the survivability of SMEs, Abdullah et al. (2014) specifically mention that their work in the development of the PS Models is limited to manufacturing companies only. However, the present results seem to indicate that it does not matter what type of industry the SME is in as this has no significant relationship with the level of risk it is facing. This research therefore rejects the hypothesis that there is a significant relationship between an SME's sub-industry and its risk.

5.5.2 Firm Size

Firm size is measured according to the annual sales value of each observation. Because of the panel nature of the dataset, company firm size categories can Table 16, it can be seen that there is no significant relationship between current firm size and all the risk measures. Of all the categorical variables used, only firm size has a non-omitted L1, because as annual sales values fluctuate over the years, companies that operate on the borderline of their respective categories can change categories from year to year.

The literature suggests that firm size should affect risk as the survivability and leverage of a firm is closely tied to its size (Altman & Sabato, 2007; Beck & Demirguc-Kunt, 2008; Forte et al., 2013). Furthermore, the literature also implies

a reduction in risk as a business grows larger, but concurrently, there is a decrease in company growth and returns (Beck & Demirguc-Kunt, 2008; Evans, 1987b; Forte et al., 2013). However, Table 16 indicates no significant difference in terms of risk between being a Medium sized company and a Micro/Small company. This has interesting implications for this dataset, considering that the minimum value of total sales is RM4,200 and the maximum value of total sales is RM40.4 million. It implies that from a risk point of view, a business with a small annual turnover is no riskier than a business with a high annual turnover. This echoes the findings of Thornhill & Amit (2003), who suggest that firms of different ages and sizes face a similar amount of risk, as smaller businesses face the risk of having a lack of resources at their disposal whereas larger businesses face the risk of not being able to adapt quickly to changes in the business environment. The literature suggests that small businesses enjoy higher growth rates than larger businesses because of their adaptability (Evans, 1987b, 1987a; Hymer & Pashigian, 1962). This, however, does not mean that small businesses generate significantly lower returns than their larger counterparts, it just means that the increase of year on year returns diminishes as a business gets larger. While the absolute returns may differ between a smaller business that has been recently set up and a larger, older business, the risk associated with that return does not change.

Table 16 indicates that neither firm size nor its L1 significantly impact the risk faced by the business. Unfortunately, due to the opacity of smaller businesses, they are still ranked as being more risky than larger businesses; however, these results shed some light on the operations of small businesses, showing that they are not significantly more risky than larger businesses, and supporting the findings of Berger & Frame (2007) in developing a credit scoring method which is fairer

towards small businesses. This research rejects the hypothesis that there is a significant relationship between an SME's size and its risk.

5.5.3 Location

According to the literature, the location of a SME, whether it be in a rural, minor urban or major urban area, is thought to have an effect on its risk level, mainly due to factors such as proximity to financial institutions and access to customers (El Ghoul et al., 2013; Hanson, 2005a). However, according to the results in the regression table, there is no significant relationship between geographic location and all four of the risk measures. While business location can be a key indicator for access to finance and business performance (Barringer & Greening, 1998; Brenner et al., 2010; Hanson, 2005a; Redding & Venables, 2004), it is not a reliable indicator for SME risk or return. This runs counter to findings by El Ghoul et al., (2013) who indicate that businesses closer to financial centres (usually major urban centres) have a lower cost of capital (lower risk) on average.

However, it should be noted that for this research, business location was determined by the reported operating address of the SME. It is possible that the reported business address may not be the actual physical location of the business. Furthermore, the majority of the observations analysed in this dataset were service businesses (1,377), which can include home-based offices that can theoretically operate from anywhere using internet connectivity. There are some incentives for businesses to maintain an 'official' address but in reality be operating in a different location, especially in the cases of special economic zones where businesses based in the area receive certain tax and policy benefits from the local government (Aggrawal, 2006; Ge, 1999; K. Hamada, 1974). With the growing use of the internet

and the advent of online financial intiatives such as crowdfunding, physical location is also no longer a constraint on access to finance, and the effect of having a reliable bank or financial market in close physical proximity may not be as important as it once was (Agrawal, Catalini, & Goldfarb, 2013; Bradford, 2012). This research cannot reject the null hypothesis that there is no significant relationship between geographic location and SME risk.

5.5.4 Business Ethnicity

Analysing the relationship between business owner ethnicity and SME risk is especially interesting in a country like Malaysia, which has many affirmative action policies geared specifically to the Bumiputra ethnicity (and by default, the Malays who make up the majority of Bumiputras), to encourage them to start businesses and engage in entrepreneurial activity (Gomez, 2012). However, this research divided ethnicity into two categories; the purely Chinese-owned businesses in one category and the ethnically owned businesses (including mixed ethnicity ownership) in the other category. This was done to reduce the number of categories in the regression, thus avoiding the problem of over-identification.

The results from the regression tables suggest that there is no significant relationship between business ethnicity and SME risk. The only risk measure that is significant is the accounting beta measure, at the 10% level. With a coefficient value of -94.25647, the ethnicity of the business owners did impact the risk measured by accounting beta; however as it was not significant at the 5% level, this research regards it as not being significant. PP beta and both the PS Models do not suggest any significant relationship between being a purely Chinese-owned business and SME risk. This has several implications. Firstly, it challenges the

notion that Malaysian Chinese have an easier time setting up/running a SME as compared to different Malaysian ethnicities. Secondly, despite all the assistance given by the Malaysian government, there is no evidence from this research that suggests this assistance has made it easier for Malays to set up and run a business, otherwise there would have been a significant relationship between business owner ethnicity and SME risk. While it is true that in migrant communities especially, members of the same ethnicity pool their finances together in order to start businesses and make investments (Brenner et al., 2010) it seems that this does not give them a significant advantage/disadvantage as compared to other races. Rasheed (2004) finds that in the USA, ethnicity affects access to capital, with white entrepreneurs getting more favourable loans than black entrepreneurs. However, while this suggests that access to finance might be easier for certain ethnicities, it does not mean that a business owned by any particular ethnicity is any more or less risky than a business owned by a different ethnicity.

The risk measures in this research look at the equity risk (PP beta), the historical risk (accounting beta) and the Survival risk (PS Models 1 & 2). Access to finance does not impact any of these risks and it can be supposed that the support network provided by ethnic minorities helps to offset the institutional advantages conferred to members of the ethnic majority, much like the way Malaysian Chinese trade unions and clans provide financial support to their members while the Malaysian Government actively supports the Bumiputra (Gomez, 2003). This research rejects the hypothesis that there is a significant relationship between business ethnicity and SME risk.

5.5.5 Business Gender

The majority of SMEs analysed in this study have mixed-gendered ownership, as pointed out in the previous chapter. Therefore in reducing the number of categories to two, for all categorical variables, purely female-owned businesses are subsumed into the mixed-gender ownership category and compared against purely male-owned businesses. Many businesses in Malaysia are mixed-gendered because they often are family-owned businesses and the husband/wife/brother/sister combination in business operations is very common (Rachagan & Satkunasingam, 2009; Zulkifli-Muhammad et al., 2009).

Table 16 shows that for PP beta and PS Model 1, there is a significant difference at the 5% level in terms of risk for purely male-owned businesses and female/mixed gendered owned businesses. To a lesser extent, the PS Model 2 also reflects a significant difference between the gender categories, albeit at a 10% level with a p-value of 0.064. The coefficient magnitude for the PP beta is small at -12.34 as are the coefficients for the PS Models 1 and 2 which are quite close to 0. The accounting beta has the largest magnitude of coefficient for Business Gender but it has the least significant relationship with Business Gender.

It is surprising to see that there is a significant relationship between the gender categories. This is because in terms of financial risk, the gender of the business owners, regardless if it was predominantly male or female, should not affect the risk faced by the SME. While previous studies have pointed out that the gender of the business owner can affect things like access to loans and obtaining favourable interest rates (Rasheed, 2004; Singh & Zammit, 1999), a study by Verheul and Thurik (2001), conducted in the Netherlands, points out there is no significant

evidence that women face discrimination when it comes to getting a loan. This point of view is also shared by Cavalluzzo et al. (2002) who find that their sample of female business owners in the USA did not face discrimination when it came to access to capital. These findings run counter to the results from the regression table, which indicate that gender does significantly affect SME risk.

It should be noted that Verheul and Thurik (2001) and Cavalluzo et al. (2002) conducted their studies in developed countries. In contrast, Singh and Zammit (1999), in their systematic review of the literature on gender discrimination in business, point out that in third-world countries, the gender dimension would have a more pronounced effect on SME risk and return. In this case, the results obtained from the regression table reflect the findings of Singh and Zammit. This study, which was conducted on a sample of SMEs from a third-world country (Malaysia) agree with the generalisation suggested by Singh and Zammit. The bulk of gender entrepreneurship studies in Malaysia focus on the factors affecting the motivation and performance of female entrepreneurs but do not compare the risks faced by female versus male entrepreneurs (Franck, 2012; Gadar & Yunus, 2009; Teoh & Chong, 2007). More importantly, these findings indicate that there is a significant relationship between the gender of the business owners and SME risk. Therefore this research accepts the hypothesis that there is a significant relationship between SME risk and the gender of the business owners.

5.5.6 Capital Structure

For the PP beta and both PS Models, the debt-equity ratio was not included in the regression because it forms a part of or shares common input figures with those respective measures. With a p-value less than 0.05, the debt to equity ratio, which

represents the gearing aspect of capital structure, is significantly related to accounting beta. However, its L1 is not, indicating that any changes to the debt equity ratio are only reflected in the current year and should not affect the accounting beta in the next year. Interestingly, for the accounting beta, the coefficient value is negative for both the current and L1 observation, indicating that the higher the debt to equity ratio, the lower the risk as measured by accounting beta. Given that the coefficient value is negative, this creates an interesting perspective on how debt affects risk. The general opinion in the literature is that higher debt leads to higher risk and most banks are reluctant to lend to highly geared companies (Anderson et al., 2003; Berger & Udell, 1998, 2002). However the results presented in this dataset imply that higher geared companies have, in fact, a lower risk (according to accounting beta). However the magnitude of the coefficient is quite close to '0' so the overall impact that gearing has on accounting beta is not very large. Debt finance is the most popular form of finance for SMEs, as debt, unlike equity, generates interest expenses that can be used to offset tax costs, which is a common practice in many regions (López-Gracia & Sogorb-Mira, 2008; Paul et al., 2007). Furthermore, many SMEs are family-owned businesses; generating finance through equity would often mean having to dilute the control of the business, which many SME owners would like to avoid (Chua et al., 2003; Gómez-Mejía et al., 2007). Having a high amount of debt does not necessarily make a SME more risky than its counterparts. Having a high amount of debt can indicate that the SME has a reasonably large amount of finance that it can use for business and expansion purposes. Considering that the accounting beta is the only risk measure that this research can regress against the debt to equity ratio, the hypothesis that there is a significant relationship between SME risk and debt to equity ratio is accepted.

However, the current ratio, which represents the liquidity aspect of capital structure, is not significantly related to any of the risk measures for both the current and L1 observations. In terms of the magnitude of its coefficient, all four risk measures have coefficient values close to '0'. It is interesting to note that current assets and current liabilities do not significantly affect SME risk, meaning that working capital management is less likely to affect SMEs' risk and return. Observed together with the results of the debt to equity ratio, this indicates that the gearing of the capital structure has a more significant effect on SME risk and return as opposed to its liquidity. This result is in line with arguments put forward by proponents of the optimal capital structure theory, which argues that a correct balance of finance is crucial to the performance of a business (Castanias, 1983; Leland, 1998; Wu, 2010). While the debt to equity ratio has a significant relationship with SME risk, the current ratio does not; because of this the research accepts the null hypothesis that there is no significant relationship between current ratio and SME risk.

5.5.7 Profitability

The profit ratio, representing the performance aspect of profitability, is measured as a percentage of profit after tax over total sales. The current observation for the profit ratio is significantly related to the PP beta and the PS model 1.. This indicates that the profit ratio only captures the risk for the current year of observation for an SME, meaning that a poor performance for a business will manifest in its risk value immediately, and the same applies for a good performance. The negative coefficient value for profit ratio with PP beta indicates that as profits go down, risk goes up. The coefficient value between profit margin and PS Model 1, however, is positive, which makes sense as the PS Model captures the survivability of a business and a more profitable business would likely have a higher survivability rate in the future.

The findings largely mirror that of previous research, indicating performance is an important aspect of risk and return for listed businesses (Dye, 2004; Ghemawat, 2002; Moro & Nolte, 2012). With regard to SMEs, performance is used to predict survivability and also credit eligibility (Altman & Sabato, 2007; Berger & Frame, 2007; Hewa Wellalage & Locke, 2012), which can also impact SME risk. This research accepts the hypothesis that there is a significant relationship between the profit margin and SME risk.

From an efficiency perspective, the return on assets ratio is significantly related to the PP beta for its current observation. A positive coefficient value indicates that a higher return is significantly related to a higher risk. This is in line with the risk-return literature, which argues that the higher the risk, the higher the return (Sharpe, 1964; Treynor, 1965a). This relationship is not found in the accounting beta measure, which is surprising, considering that the accounting beta is meant to be a reflection of the historical performance of the SME. Perhaps if greater lags were used in the regression, a relationship might be evident; however, using too large a lag amount can result in a reduced observation count and omission of other variables, affecting the accuracy of the regression. The relationship between the return on asset ratio and the PS Models 1 and 2 was not examined, due to the return on asset ratio being a key input figure in their calculation. That asset sizes impact the risk faced by an SME is an intuitive idea, as assets are closely tied to the finance used by the SME. If a higher level of debt leads to a higher level of assets, then a higher return on those assets would be expected due to the resources at the SME's disposal. This research accepts the hypothesis that there is a significant relationship between the return on assets and SME risk as there is a significant relationship between an SME's return on assets and its risk.

From an investor's return perspective, this research analyses the relationship between the return on equity and SME risk. Not surprisingly, it is significantly related to the current observation for the PP beta. Being a return measure as well, it shares similar characteristics with the return on assets. Interestingly, for the PP beta, the coefficient is negative for the current observation, meaning that the relationship between risk and return is inverse when it comes to equity. This situation seems to go against the conventional wisdom that higher risk equates to higher return. SMEs that favour equity finance (a less risky form of finance), on the other hand, have equity sourced from stable sources such as personal finances or the funds of immediate family members, which lowers the SME risk profile. Furthermore, most SMEs (including the ones in this dataset) tend to favour high debt finance over equity finance (Fourati & Affes, 2013; Paul et al., 2007). It can be argued that the bulk of the returns generated by SMEs come from debt-related sources and that as the proportion of equity finance to debt finance decreases in an SME, its returns will increase as well. This explains the negative relationship between the return on equity and PP beta. This research accepts the hypothesis that there is a significant relationship between the return on equity and SME risk.

5.5.8 Firm Age

The figures for the current observation for firm age were omitted from the regression due to collinearity. The discussion is based on the L1 variable for firm age. Table 16 shows that there is no significant relationship between SME risk and firm age across all measures. Firm age was not regressed against PS Model 2 as it was an input figure in the calculation of PS Model 2.

In research on business survivability, firm age is consistently mentioned as a factor that predicts survivability, performance and growth (Evans, 1987b; Lundvall & Battese, 2000; Thornhill & Amit, 2003). However, it should be pointed out that survivability and risk are not the same thing, especially in the case of the PP beta. Interestingly, firm age does not relate to the survivability of the business as measured by PS model 1, indicating that firm age does not affect the gearing and efficiency of the SME (both items are used in the calculation of the PS Model 1). Firm age is also not significantly related to the accounting beta. Accounting beta, being a measure of historical performance, does not capture the relationship between the number of years an SME has been existence and its risk. This means that firm age as a whole might have no impact on risk whatsoever. The implication that firm age does not affect financial risk and return means that the development of credit scoring practices that are biased towards older firms may be creating unnecessary challenges for new business start-ups (Berger & Frame, 2007; Vanacker & Deloof, 2013). This also lends support to initiatives that support start-up businesses, indicating that young firms do not face significantly more or less financial risk than their older counterparts (Davila & Foster, 2007; Ruth Helen Samujh et al., 2012). This research rejects the hypothesis that firm age is significantly related to SME risk.

5.5.9 Owner Age

Table 16 shows that only the PS Model 1 is significantly related to owner age. PS Model 2, however, does not share this relationship, perhaps because the firm age mitigates the effect that owner age has on the PS Model 2 results. PP beta and the accounting beta are also not significantly related to owner age. All this indicates is

that owner age is mostly useful only as a predictor of an SME's survivability from a purely financial perspective.

Looking at the relationship between the PS Model 1 and owner age, it is significantly related for both the current observation and its L1. The coefficient for the current observation is positive, indicating that the older the average owner, the more likely the business is to survive. This is in line with existing research, which finds that most SME owners are between 45 and 55 years of age (Ahmad, Ramayah, Wilson, & Kummerow, 2010; Cope, 2005). These findings echo those of Moro and Nolte (2012) who suggest that the past performances of the owner(s) of the business are more important than the age of the owner in estimating the risk and return associated with the SME. The literature indicates that the age of the owners is an important factor in starting a business, and there is the implication that older, more experienced individuals are more successful in starting a business, having built up connections and expertise in their field (Bates, 1990; Butler, Doktor, & Lins, 2010; Wales, 2015). Arguably it is experience that counts with regards to business performance and owner age is merely a proxy for the experience of the business owner(s). Unfortunately, due to data limitations, this research could not test for the business management experience of the business owners in the dataset. Because of the significant relationship between owner age and the PS Model 1, it can be said that there is a significant relationship between SME risk and owner age. This research accepts the hypothesis that there is a significant relationship between SME risk and owner age.

5.5.10 Concentration of Ownership

The largest share percentage held by the largest shareholder in the business is used as a means of measuring the level of ownership held in the hands of one individual. Where business ethnicity and business gender looks at the aggregate ethnicity/gender of an SME's registered owners, this variable looks solely at the amount of shares held by one individual. According to Table 16, there is no significant relationship between any of the risk measures and the largest share percentage. The regression between accounting beta and concentration of ownership has a coefficient magnitude of 239.2, indicating a large, but not significant impact of the concentration of ownership on accounting beta.

Running contrary to research on principal-principal agency cost, this study finds that concentrating the ownership of a business in the hands of one individual does not significantly affect its risk or its return. Research on principal-principal agency cost argues that if ownership is centralised in the hands of one party, agency costs can arise (Renders & Gaeremynck, 2012; Ward & Filatotchev, 2010; Young et al., 2008). While the largest share percentage was also used in these studies as a means of investigating the concentration of ownership, other factors such as managerial control were also used in determining the amount of control the controlling party actually has over the business. In this research however, the dataset did not contain information on managerial control over the business, so that could not be factored into the regression. On the other hand, there is also a lot of research that suggests an increased concentration of ownership leads to lower principal-agent agency costs, as the goals of the manager and the principal align (Ang et al., 2000; Greenwood, 2003; Jensen, 1986; Jensen & Meckling, 1976). Table 16 may be seen to indicate that as the concentration of ownership increases, the risk arising from principal-

agency conflict reduces but principal-principal conflict increases. However the increase in PP conflict is offset by the decrease in PA conflict, thus the net effect on the SME risk is immaterial. This research rejects the hypothesis that there is a significant relationship between SME risk and concentration of of ownership.

5.6 Comparison Between the Risk Measures

With the results obtained from the correlation matrix and the regression table, this research could objectively compare the effectiveness of each individual risk measure in reflecting the risk of SMEs, given its relationship and correlation with other SME characteristics. The results from the previous two sections are summarised in Tables 17 and 18:

Table 17: Correlation summary table

Risk Measure	PP Beta	Accounting Beta	PS Model 1	PS Model 2
No. of Sig. Corr.	15	3	12	13

Table 18: Regression summary table

Variable/Risk Measure	PP Beta	Accounting Beta	PS Model 1	PS Model 2
Industry	Not Significant	Not Significant	Not Significant	Not Significant
Size	Not Significant	Not Significant	Not Significant	Not Significant
Location	Not Significant	Not Significant	Not Significant	Not Significant
Business Ethnicity	Not Significant	Not Significant	Not Significant	Not Significant
Business Gender	Significant (--)	Not Significant	Significant (--)	Not Significant
Debt to Equity Ratio	NA	Significant (--)	NA	NA
Current Ratio	Not Significant	Not Significant	Not Significant	Not Significant
Profit Margin	Significant (--)	Not Significant	Significant (--)	Not Significant
Return on Assets	Significant (--)	Not Significant	NA	NA
Return on Equity	Significant (--)	NA	Not Significant	Significant (--)
Firm Age	Not Significant	Not Significant	Not Significant	NA
Owner Age	Not Significant	Not Significant	Significant(--);(L1)	Not Significant
Concentration of Ownership	Not Significant	Not Significant	Not Significant	Not Significant
Control Variables				
Total Sales	Not Significant	Not Significant	Not Significant	Not Significant
Total Debt	NA	Not Significant	NA	NA
Total Assets	NA	Not Significant	NA	NA
Total Equity	NA	NA	Not Significant	Significant (--);(L1)

Note:

(--) = Significant for current observation

(L1) = Significant for L1 observation

In comparing the different risk measures, it is important to first review the methods and justifications behind the use of each risk measure. The PP beta reflects the relative level of risk faced by the SME, benchmarked against its closest market-listed proxy. Therefore, to a certain degree, it reflects the risk faced by that particular sector and the risk faced by an SME operating within that particular size category for that sector in any given year. The accounting beta measures the risk as a function of the historical performance of a single SME benchmarked against the performance of the investment portfolio as a whole (in this case, the portfolio is taken to be the entire dataset). Therefore, the accounting beta gives an overview of the risk associated with an SME's performance, compared to other SMEs within the same portfolio. Both the PS Models are functionally similar, with the main difference being the use of firm age in PS Model 2. Otherwise, both PS Models use the input figures of return on assets and the debt to asset ratio. Despite their similarities, however, the models do not share a single independent variable that significantly relates to both of them, meaning that the addition of firm age changes the parameters of the probability of survival of a firm.

Overall, the PP beta has the highest number of correlations and significant relationships with SME characteristics. This is not to say, however, that it is the best or the only method of risk measurement that should be used. From an investor's perspective, using the PP beta to estimate an SME's risk can give a good indication of its future performance (Profit margin, Return on Assets, Return on Equity). Table 16 indicates that the gender balance of SME owners can also affect the PP beta, which in turn will affect its performance variables. Therefore, if used from an investor's return perspective, the PP beta is a very effective measure of SME risk.

The accounting beta has the fewest number of correlations and significant relationships with SME characteristics. It is only significantly related to the debt to equity ratio, a variable which was not regressed against the other risk measures because it shared input figures with them. This means that in the event that other risk measures are unsuitable for use, the accounting beta can be a reliable indicator of risk associated with SME gearing. For SMEs looking to increase their debt capacity or banks looking to lend to small businesses, the accounting beta is a useful indicator of the risk faced by the SME. However, due to its low correlation with other SME characteristics and risk measures, it is not very reliable in providing an overall risk measure for any SME.

Looking at the probability of survival, it is worth noting that while risk does not necessarily equate to business survival, the reason why these models were chosen is that they can be used as input figures for cost of equity calculations, which are comparable to the cost of equity calculations using CAPM (of which beta is an input figure) (Cheung, 1999). As such, they can be compared side by side with the beta figures (PP beta and accounting beta) but it should be remembered that they predict the likelihood of survival of the SME only within the next year. Abdullah et al. (2014), who developed the PS Models, indicated that the PS Model 2 has better predictability than the Model 1. However, this research tested both models and fromTable 16, it can be seen that each model relates differently to different SME characteristics. Model 1, which only uses financial indicators, closely mirrors the relationships of PP beta, with a significant relationship for business gender and profit margin. More importantly, it captures the effect that owner age has on the survivability of the business, with older owners being more likely to succeed. Model 2, on the other hand, is only significantly related to the return on equity and

the control variable, total equity. It is interesting that with the addition of firm age, business gender, profit margin and owner age do not impact the risk of survival. However, given that extant research strongly indicates that these three factors do affect SME risk, this research would argue that the PS Model 1 is more in line with findings from the literature (Moro & Nolte, 2012; A. Singh & Zammit, 1999; Wahyudin, Djatna, & Kusuma, 2016).

The objective of this research was to answer the following research questions:

1. What is a suitable measure of SME beta to calculate required return?
2. What is a suitable measure of SME survivability to calculate required return?
3. What is the relationship between SME risk and its financial characteristics?
4. What is the relationship between SME risk and its owners' characteristics?
5. What is the relationship between SME risk and its firm characteristics?

To this end, this research found that PP beta is the most suitable measure of SME risk for most investor-related appraisal processes. However, it must be noted that using it in conjunction with a survival prediction model allows for a more holistic view of business operations, as the likelihood of business failure is also an important aspect of SME investment/operations. As for SME survivability, The PS Model 1 was shown to be significantly related to business gender and owner age, two non-financial variables that have an impact on SME operations but whose effects have not been quantified in any meaningful way in previous research. This research has established that the use of PP beta, in conjunction with a survival prediction model, can reliably measure SME risk.

The relationship between SME risk and its characteristics is not entirely as was expected. Many of the characteristics that were believed to be likely to affect SME risk turned out to not be significantly related to any of the four risk measures used in this research, as has been discussed in previous sections. Financial characteristics such as profitability and capital strucuture have an impact on risk, but the concentration of ownership has none. In terms of owner characteristics, gender and owner age have a relationship with risk, indicating that owner background and experience can affect the risk faced by an SME. Looking at firm characteristics, none of the variables are significantly related to risk, indcating that industry, size, location and age of the firm are not relevant in determining the risk faced by an SME. These are relevant findings for SME owners, lenders and investors, as the risk relating to an SME may not be as heavily influenced by external, non-financial factors as the existing literature suggests it to be. However, the results do reaffirm previous findings that liquidity, performance, owner experience (age) and gender affect SME risk.

This chapter represents the culmination of this research work. The use of the Kendall's Tau correlation matrix and the dynamic panel data GMM regression allowed a statistical insight into the correlations and relationships between the different SME risk measures and their characteristics.

The research questions were answered and the results show that the combination of PP beta and a survival prediction model can reliably predict SME risk as it relates to a number of performance-, gender- and age-related variables. Industry, size, location and ethnicity were found to be not significantly related to any form of risk measure, indicating that using the leverage provided by modern infrastructure and

communications, smaller businesses in the service industry in remote locations can operate at a level where they are not significantly disadvantaged when compared to larger, manufacturing businesses located in urban centres. Furthermore, social mobility in Malaysia means that ethnicity does not affect the risk of setting up an SME. In the final chapter, these results are used to suggest future research directions.

5.7 Comparison of pre and post 2008/09 financial crisis results

In late 2008 and early 2009, the sub-prime financial crisis hit the global financial system hard. While the countries most affected by it were European and North American countries, there was an effect felt by firms in developing countries as well, as some of their largest trading partners (such as the USA) were adversely affected, thus hampering their ability to do business with firms in developing countries (Dijmarescu, 2009; Longstaff, 2010; Phillips & Yu, 2011).

A comparison of the results between the pre and post crisis periods would have been able to add some additional insights to this research, however this was found to be unfeasible due to the limited number of observations should the dataset be evaluated as two separate (pre and post) time series. Assuming there is a sufficient number of observations, the Difference-in-Difference (DiD) regression model would be ideal to measure for significant differences between the pre and post crisis periods. Consideration is also given to the T-test and the Analysis of Variances to measure if the two periods are significantly related or not. However, owing to data limitations, this research cannot adequately answer the question regarding the impact of the 2008/09 financial crisis on SMEs in Malaysia.

Malaysia as a whole was not hit hard by the financial crisis, mainly due to its conservative fiscal policy and wariness towards credit-swap derivatives. However,

loss of sales from some of their largest trading partners did cause some firms to seek longer credit lines from their suppliers to cover the slump in sales (Coulibaly, Sapriza, & Zlate, 2013; Reinhart & Rogoff, 2009). As such the null hypothesis in this case would be that the risk of Malaysian SMEs are not adversely affected by the effects of the 2008/09 financial crisis. Based on the limited number of observations, this research is unable to reject the null hypothesis and accepts it.

5.8 Chapter Summary

This chapter discusses the results from the regression model and correlation analysis carried out on the variables. Both significant and non-significant relationships were analysed and the risk measures compared and contrasted against one another. A comparison for pre and post financial crisis results was also made, which indicated that Malaysian SMEs as a whole did not fare poorly as a result of the financial crisis. The findings were discussed and the results are of importance to business owners and policy-makers alike.

6 Conclusion and Implication

6.1 Summary of the Study

This research involved an empirical investigation into the measurement of risk in SMEs in a Malaysian context. To this end, it investigated the use of a suitable risk measure for SMEs and analysed the relationship between SME risk and its characteristics. Lenders, SME investors and business operators need to have good risk measures that can reflect the impact that a range of factors have on SME operation. By testing different models of SME risk estimation against characteristics common to SMEs, this study compared the results of these measures to obtain a better understanding of what risk measures work best for SMEs.

The study was conducted based on a sample of Malaysian SMEs, taken from the Malaysian Companies Commission database. This database is the best available database of financial information, containing financial and non-financial information for all registered businesses in Malaysia. It is a suitable database, which was used as a means to explore questions regarding SME risk and operations in Malaysia, a newly-industrialised country that is transitioning from developing to developed status.

A discussion on the background of SMEs in Malaysia provided insight into the conditions that affect SME operations in Malaysia. The operating activities, ownership structure and corporate governance of SMEs in Malaysia were discussed, including the high number of family-owned businesses in Malaysia, which explains the highly-centralised nature of many Malaysian SMEs. The presence of affirmative action policies benefiting the Bumiputra has also created a unique business environment where Bumiputra entrepreneurs are seen to have an advantage over

non-Bumiputras. However, according to reports from the SME Corporation Malaysia, Bumiputra participation in business activities still remains low. Being a majority-Muslim country, the presence of Islamic finance in Malaysia has allowed the creation of a debt market that is theoretically 'interest-free', as interest is considered usury, which is haram (forbidden) according to Islamic jurisprudence. However, banks still calculate profit from their Islamic products using conventional interest rates in order for their products to be commercially viable. These factors have created an interesting SME environment in Malaysia.

Since the most recent re-definition of the SME categorisations in 2013, the SME operating environment in Malaysia has not changed greatly; nor have there been any new pieces of legislation that significantly impact the way SMEs do business in Malaysia. The social demographics in Malaysia are expected to remain the same, with Islamic finance playing a larger role in financing in future years. This creates more choice and variety in terms of financing for SMEs, and options for more discerning Muslim-owned SMEs. The Malaysian government has, over the years, provided a lot of support to the SME sector through the provision of finance, grants and initiatives geared specifically towards SMEs.

Many of the risks involving SMEs are related to the difficulty of accessing finance, competition faced from larger businesses, and the lack of resources to enable SMEs to weather adverse economic conditions. These factors contribute to the risks in running a SME. It can be argued that these operational risks will translate into financial risk. In risk and return theory, the higher the risk faced by a business, the higher its return should be. However, there is a lack of generalisable, empirical studies measuring SME risk from a financial perspective. An overview of the

different risk and return models available in the literature was presented and the common aspect in several of the models was identified as the presence of the beta value, which represents the financial risk associated with investments made in the business. An attempt was then made to explore the different means of calculating risk for SMEs, namely the probability of survival method, the accounting beta method and the pure-play beta method.

In the history of SME risk research, the concept of SMEs facing risky operational situations only emerged after the 1970s, as the earlier opinion was that SMEs did not face agency conflict because management and control was centralised in the hands of one party. Subsequent research proved that this is not the case and that SMEs do indeed face risks from a myriad of sources. A lot of this risk can be traced back to the ownership structure of SMEs, which affects their governance and in turn affects the risk arising from principal-principal agency conflict situations. The recognition of SME risk was a turning point in SME risk research in the 1990s, with greater acknowledgement of the risk faced by SMEs.

The recognition of SME risk led to the development of methods to calculate SME risk and return. This thesis has traced the development of risk and return from its origins in the stock market to models that are specifically designed to work with unlisted companies. From the first development of the Capital Asset Pricing Model to its numerous iterations and derivative models, the different aspects of risk and return calculation were considered, culminating in the determination of what aspects of these risk and return models are applicable to SMEs. The identification of the accounting beta, pure-play beta and probability return methods as suitable

risk measures for SMEs allowed this research to demonstrate their application on panel data for SMEs based in Malaysia.

A discussion of the relationship between SME risks and characteristics illustrated how different aspects of SMEs can potentially affect their risks. This discussion also served to outline the initial assumptions and hypotheses that were used later in the hypothesis development section. However, not all of the characteristics identified were tested in the study, largely due to data constraints.

In the development of the hypotheses, four different risk estimation models were outlined: the PP beta, Accounting beta and the two probability of survival models, 1 and 2. These risk measures were selected because they can be used to calculate the cost of equity for an SME using the CAPM (for PP and Accounting beta) and Cheung's (1999) survival cost of equity model (for the PS Models) respectively. The list of dependent variables were also outlined and a conceptual framework of the relationship between SME risk and these independent variables was provided.

The sample was derived from the dataset of SMEs provided by the Malaysian Companies Commission. The final sample size was arrived at after going through several stages of cleaning, which included listwise deletion of missing variables, the removal of all negative equity figures and the elimination of dormant companies from the sample. Outliers were not treated or removed in the dataset because they were deemed to represent actual behaviours in the business environment and removing them would have misrepresented the results obtained in the regression.

The threat of endogeneity was explored and the shortcomings of commonly used panel data regression models for dealing with non-normally distributed data, such as panel OLS, were explained. In order to overcome the problems of data

endogeneity, especially when dealing with business research, where the threats of simultaneous causality are high, the dynamic panel GMM estimator was used. The GMM estimator uses a series of moments identified in the regression model in order to run a regression using lag instrumental variables from prior observations in the dataset.

To determine the initital relationship between the SME risk and SME characteristics, a Kendall-tau correlation matrix was run. The results of the correlation matrix indicated that PP beta had the highest level of significant relationships with all the continuous variables in the study. With the four different risk measures selected as the dependent variables, the GMM regression was run, using a lag of up to one period for all independent variables. Tests of validity such as auto-correlation, over-identification of instruments and exogeneity of instruments were carried out and established the model as valid.

The results resulted in the rejection of many of the hypotheses derived in earlier chapters, but they provided some interesting viewpoints on the relationship between SME risk and SME characteristics. One notable outcome involved establishing that there was no relationship between SME risk and ethnicity. This means that the ethnicity of the business owners does not significantly affect the business's risk. It does not mean that ethnic discrimination does not exist in Malaysian business practices, but it does mean that such discrimination does not affect the business operation in any significant way. Significant negative relationships between the profit ratio and SME risk seem to affirm the belief that better performance leads to lower risk. The significant relationship between the debt to equity ratio and the accounting beta (the only risk measure it was regressed against) support findings

from the literature that higher amounts of debt lead to higher risk. Owner age as a proxy for managerial experience was significantly related to the probability of survival as calculated by PS Model 1, indicating a relationship between owner age and SME risk. The results also indicated that geographic location, concentration of ownership, firm size, firm age and the sub-industry an SME is in do not significantly affect its risk.

This research has demonstrated the application of different SME risk measures including the PP beta, a method commonly used in estimating the divisional beta for multi-divisional companies; the accounting beta, a fairly simple calculation of the year on year change in a company's ROE, which is based on historical accounting performance; and the probability of survival models which make use of financial information (PS model 1) and firm age (PS model 2). The application of all these risk measures to a dataset of unlisted SMEs in Malaysia has shown that these measures can be used in a context where there is limited SME information. By testing the relationship between SME risk and various SME characteristics, this research examines whether the findings and assumptions made by previous researchers hold up to scrutiny. Furthermore, the use of the dynamic panel GMM estimator in the field of SME risk is a relatively new and unexplored application of the model.

From the results obtained, this research found that the PP beta has a more significant correlation and relationship with SME characteristics than the other risk measures. Because of this, this research recommends that the PP beta is the most suitable form of risk measure for SMEs. However, a combination of different risk measures would provide a more complete and holistic picture of SME risk. Therefore, the use

of the PP beta, combined with a probability of survival model (PS model 1 or 2) provides an overview of risk from the market proxy and survivability point of views.

6.2 Addressing the Problem Statement

In Chapter 1, the problem statement was outlined as having three dimensions. This thesis has addressed those dimensions as follows:

6.2.1 The Risk Associated with SMEs

SMEs inherently face more risk than larger companies, as has been emphasised several times in this thesis. This risk is attributed to resource constraints as well as managerial and operational issues that are endemic to SMEs. However, this risk has not been sufficiently quantified; nor is there a significant amount of research on its relationship with SME characteristics. This study has demonstrated the most feasible methods of calculating SME risk and their application to a panel dataset of SMEs. More importantly, the relationship between the risk calculated by these models and SMEs' characteristics wa analysed, drawing attention to the areas that are vital to managing the level of risk exposure faced by SMEs.

6.2.2 The Perception and Attitudes Towards SME risk

As pointed out in the first chapter, SME entrepreneurs/owners do not consider financial risk to be a major concern to their business. Marketing, HR, sales and other operational aspects are considered to be areas of more pressing concern. Arguably, an SME's financial performance is affected by these ancillary functions, therefore the measurement of SME risk from a financial perspective will be of great interest to SME owners as it provides an overall reflection of their SME's risk exposure based on its current operating conditions. It is difficult to change the opinions of business owners as to what constitutes 'crucial' areas for their

businesses. However, through the demonstration of SME risk calculation and the mapping out of the relationship between SME risk and SME characteristics, these owners are now in a better position to understand the financial risk faced by their businesses. This relationship between risk and SME characteristics will make it easier for SME owners to align their business concerns with their SME's financial health.

6.2.3 The Assessment of SME Finance Risk

As mentioned in Chapter 1, SME financial risk is often estimated by banks using credit-scoring methods. Often, the likelihood of SMEs successfully applying for loans depends on their relationship with the banks, as relying on credit scores alone may not allow SMEs to gain access to appropriate finance. This research demonstrated the calculation of SME risk, which can be translated into a calculation of required returns for the investor/owner. This means that by estimating SME risk using a combination of the methods used in this research, providers of finance will be in a better position to objectively evaluate the risk faced by a business, instead of having to rely on the subjective judgments of finance officers in disbursing funds to SMEs that need them.

6.3 Contribution to literature

As mentioned in the first chapter of this thesis, this research is the first of its kind to objectively compare and evaluate the Pure-play beta, accounting beta and the probability of survival models against each other using a dataset of SME financial and non-financial data.

Furthermore, this research empirically estimates the relationship between SME risk and characteristics. This particular aspect of the research has yielded some very interesting findings.

The significant relationships between risk and profitability and owner age were interesting, however, they were very much in line with what the literature suggests. What is of greater importance was the significant relationship between risk and gender which implies that female business owners operate riskier businesses as compared to men and as such would require a higher level of return to compensate for this added level of risk. As a developing nation, gender equality is an important issue for Malaysia. This finding is of particular importance to policy makers in creating policies to specifically benefit female business owners. This is an especially interesting development for further research in the field of female business ownership.

Some of the non-significant relationships were important as well. Most noticeably, the lack of any significant relationship between ethnicity and risk suggests that the ethniciy of the business owner has no bearing on the risk faced by the business. Given that Malaysia practices affirmative action policies that favour those of Bumiputra descent, these findings indicate that other ethnicities are not significantly worse off for it. Conversely, the perceived dominance of the ethnic Chinese in the Malaysian economy is a subject of frequent debate. These results also suggest that being Chinese does not significantly affect the risk of doing business in Malaysia, which suggests that Chinese business owners do not have it easier than business owners of other ethnicities. This finding is of interest to future research in ethnic studies based in Malaysia and in other countries around the world.

6.4 Research Limitations

The first limitation of this study was the dataset, as the research could only be carried out on variables available in the dataset provided. While the dataset was fairly comprehensive in recording various financial and non-financial details of SMEs in Malaysia, a more expansive database could allow for the testing of other characteristics such as owner's experience, the use of Islamic finance and the impact of the cost of debt on SME risk. With such information, this research would have been able to develop further insights into other factors and their relationships with SME risk and return.

Secondly, the beta measures assume a degree of diversification in the SME owner's portfolio, as beta represents the unsystematic risk associated with investments that cannot be diversified. One of the issues with SMEs is that SME owners tend to have most, if not all, of their investments tied up in one company, thus the risk calculated for SMEs represent the owner's total risk as it is not diversified. However, for the purposes of benchmarking and comparison, the beta measures provide better comparability across different businesses. As mentioned before, the survival models used in this research capture survivability and not 'risk' as variation in return, unlike the beta measures. However, because of its use in calculating cost of equity through Cheung's (1999) survival probability return model, it is deemed as a 'risk' input equivalent to beta. Its limitation is that it cannot be used as a measure of variation in return as it is just a measure of survivability of the business. Furthermore, the risk models used in this research are used primarily in calculating return due to the investor, and the cost of equity for the business. They do not measure the cost of debt. Unfortunately, due to data constraints, the dataset did not

have information on interest costs so the cost of debt for SMEs is something that was unexplored in this research.

Thirdly, while Malaysia, as a newly-industrialised country, straddles the line between a developing and developed nation, the data obtained from the dataset was still largely representative of regional operating conditions. Therefore findings made in this research may not necessarily be generalisable across all economic and geographical regions. However, the results of this study can be used as a benchmark of sorts in designing similar research in different contexts in the future.

Finally, in the case of the PP beta, a publicly-listed stock exchange for small capital shares is a definite prerequisite to its calculation. In countries where such exchanges do not exist or are infrequently updated, this research cannot recommend the use of the PP beta method; other methods such as the accounting beta method may be more applicable. However, in jurisdictions where there is a robust small-capital market, the PP beta should be used, provided that the ungeared proxy beta selected from the small-capital market meets all the necessary requirements for use in the calculations.

6.5 Suggestions for Future Research

Calculating the SME risk is just one part of the larger picture, which is the calculation of the cost of capital for SMEs. Unfortunately, due to data constraints with regard to the cost of debt, the cost of capital for SMEs was not explored in this research. Nonetheless, this research is still a step in the right direction. Future research should try to investigate the relationship between SME characteristics and their cost of debt so that the effect these financial and non-financial factors have on the overall SME cost of capital can be determined.

This research is, to a certain extent, representative of economic operating conditions in South East Asia and surrounding economic regions. However, it is possible that the relationships established in this research may prove to be untrue in different geographical contexts. Although this research found that there is no relationship between SME risk and geographical location, this was done on an intra-country basis. There may very well be differences found when running a similar study in Norway, as opposed to Malaysia, for example. It might yield a different result, due to an increased tax rate and a vastly different business and societal culture.

The effect of managerial experience and different work cultures is something that has been widely researched for SMEs; however, quantifying the relationship between these variables and SME risk is something that has not been done before. With access to the right sources of information, future research can look at the relationships between different management techniques, the educational level of SME owners and entrepreneurial experience with SME risk, which should give a more interesting insight into how business operations affect risk.

With the growing popularity of Islamic finance as a competitive and valid financial tool, it is also important to check whether the assumption that Islamic finance is less risky than conventional finance is true. Islamic finance is said to have a very strong grounding in contractual obligations between both parties and most Islamic financial transactions are backed by physical assets. From a religious point of view, it is claimed that Islamic finance is superior to conventional finance because the rates are pre-agreed upon by the financier and the borrower, thus eliminating the uncertainty element from the finance equation, which in turn reduces risk. With access to information regarding Islamic financing practices, future research can

investigate the relationship between Islamic finance and SME risk using the methods outlined in this research.

6.6 Implications of the study

6.6.1 Implication to the existing theory

Using risk measures derived from the literature, this research has empirically tested these measures against SME characteristics and outlined their use in an SME context. This thesis has demonstrated the application of the PP beta, Accounting beta and Probability of Survival methods in estimating SME risk and its relationship with SME characteristics using the dynamic panel data GMM estimator. In an environment where SMEs face high churn, additional information regarding risk and its relationship with SMEs can be an important tool in reducing the rate of SME failures. The problems commonly associated with SMEs, such as opacity, poor financial planning and a lack of resources can be mitigated to some extent with the use of risk estimation measures. The first step to managing SME risk is to identify and measure the SME's risk exposure. Once the risk is recognised, steps can be taken to manage the different characteristics of the business to reduce the risk exposure and increase its survivability.

6.6.2 Implication to practitioners

By estimating SME risk, business owners can determine whether their business is providing them with an appropriate return As part of the wider effort to reduce SME turnover, this reseach has contributed an important analysis and demonstration of the risk measurement tools available to all parties involved in SME development. If the business isn't delivering the required return, they can investigate the impact that other factors have on their business risk, make the necessary adjustments or

simply divest if it becomes apparent that the financial risk of operating the business is too high.

This research has established which characteristics of SME operation affect risk and the best ways to measure them. It is hoped that this knowledge can help individuals to make informed decisions regarding SME policy and practices. When the risk is known, the required return to investors can be calculated. The required return is one part of the cost of capital calculation, which represents the overall minimum level of return required by both equity investors from the SME. This research also represents the first step on the research path of empirically estimating SMEs' cost of capital, which may be investigated in future research.

6.6.3 Implication to the regulatory bodies

This research has important implications for policy makers and lenders alike. It can be used as a stepping stone for further research in the field of SME risk and cost of capital. It also serves as an example of the use of dynamic panel data GMM in analysing SME risk. This research has shone some light on issues faced by Malaysian SMEs, in a developing economy which is one of the largest economies in Southeast Asia. These issues include its affirmative action policies and its development as an Islamic finance hub in the region.

In terms of policy, it has illustrated the relationship between SME risk and its characteristics, which allows for the implementation of policy designed to enhance key aspects of SMEs, such as providing education on optimal capital structure and supporting female-owned SMEs through grants and mentoring programmes. The identification of significant relationships between gearing and lending ratios with SME risk is relevant to lenders and can assist them in pricing their loans to SMEs.

The finding that firm size and age are not significantly related to SME risk may also encourage lenders to provide more favourable terms to smaller and younger SMEs. Investors and SME owners can benefit from having additional tools they can use to estimate SME risk and return. It is also hoped that the investigation of the relationship between SME characteristics and risk can provide insights into ways to reduce the high failure rate common amongst SMEs. SMEs may be smaller and contribute less on an individual basis to the national GDP compared to larger companies, but their size makes them no less important. A robust economy relies on having a robust SME sector and this research has contributed to the betterment of SMEs.

To end this thesis, a traditional Malay quote is appropriate:

"Kecil-kecil cili api,"

(Small is the fiery chilli – do not underestimate something just because it is small)

7 References

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